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RAINBOW BRIDGE



The vanguard of our pack train on the return from the Rainbow Bridge. The level brook at the bottom is one of the natural agencies that helped to chisel the Bridge.

RAINBOW BRIDGE

*Circling Navajo Mountain and Explorations
in the "Bad Lands" of Southern Utah
and Northern Arizona*

BY

CHARLES L. BERNHEIMER



ILLUSTRATIONS
FROM
PHOTOGRAPHS

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First Edition

THIS VOLUME IS DEDICATED TO
MY WIFE
CLARA S. BERNHEIMER

FOREWORD

In writing this record of travel exploration in the desert lands of our American Southwest my object has been two-fold. To instil a love for nature even in its bleakest and sternest mood where the conventionally accepted exhibits of beauty are not found, but where beauty, if the traveller wishes to see, exists in fullest measure, and to urge upon others to do as I have done.

I am confident that my travelling companions will not consider it an indiscretion that I have given their real names. I hoped thus better to approximate the informalities of campfire talks, that "children's hour" of grown-ups living in the open.

The idea of giving much space to pictures was suggested by the popularity and the educational value of the *National Geographic Magazine* and of *Natural History*, the magazine published by the American Museum of Natural History of New York City.

The journeys described were made in the period of 1915 to 1923, but refer more particularly to those made in the years of 1919 to 1923, inclusive.

I do not pretend to be even an amateur naturalist. I have simply tried to absorb what I saw and felt and heard. I have made deductions of my own and have checked them with those of my companions. I have

wanted to see with the eye of the naturalist and to stimulate my powers of observation and deduction.

The recital is based on a diary, the entries in which were made daily while in camp, sometimes while waiting for the packtrain to be loaded or unloaded, sometimes while meals were being prepared. The diary took the form of a letter addressed to my wife, though I was the courier.

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DRAMATIS PERSONÆ

JOHN WETHERILL, *Kayenta, Arizona*

Discoverer of Rainbow Natural Bridge, guide, student, geologist, and expert on matters relating to the American Indian; United States Government Custodian of Rainbow Natural Bridge and Cliff Ruins.

MRS. JOHN WETHERILL, *Kayenta, Arizona*

Known to the Indians as Shema Yazi, "my little mother"; a woman of extraordinary ability in handling Indians; a student of Indian folk-lore; lecturer at the University of Arizona and elsewhere.

EZEKIEL (ZEKE) JOHNSON, *Blanding, Utah*

Man of great experience as guide, possessing extraordinary knowledge of the country and Indians of Arizona and Utah; United States Government Custodian of National Monuments and Natural Bridges in White Canyon.

AL SMITH, *Kayenta, Arizona*

Horse wrangler; general utility man; faithful, reliable, co-worker, guide and understudy to John Wetherill.

JESS SMITH, *Kayenta, Arizona*

Al Smith's brother; another understudy to John Wetherill; fearless and determined; horse wrangler.

EARL H. MORRIS

Representative and Curator of the American Museum of Natural History of New York City at the excavations of prehistoric sites in Aztec, New Mexico; an experienced archæologist and frontiersman.

CHARLES L. BERNHEIMER

Tenderfoot and cliff dweller from Manhattan.

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THE 1921 EXPEDITION

RAINBOW BRIDGE

The Urge of the Subconscious Wish

Boys will have ambitious dreams. It is fortunate that they do, for these often live on as smouldering flames buried in ashes for years, sometimes coming to the surface too late for realization. My boyhood's dream, no doubt the result of affectionate reading of the Leather-Stocking Tales and other stories dealing with the West and Southwest, fixed Arizona as the land of mystery to be penetrated only by the most hardy and brave and laid the foundation for a wish. Henry M. Stanley, David Livingston, and Humboldt fired my imagination. Nansen, Sven Hedin, Greely, and Peary kept it alive. In later years the romances and exquisite descriptions of Zane Grey contributed their share toward the planning which finally led me to turn my vacations into something more substantial, to do in a small way what our big explorers and discoverers were permitted to do on an heroic scale. The Rainbow Bridge country in northern Arizona, southern Utah, the desert wastes in western New Mexico, became the focus of my attention. I read many books and articles on the subject, but none influenced me more in my final determination than Prof. Herbert Gregory's

treatise on the Navajo country, printed by the United States Geological Survey. It gave me something definite on which to plan. I believed him to be a safe pilot.

Earlier journeys from the city of Santa Fé north into the mountains north and southeast of Albuquerque, to the Pueblo of Zuni to see the Shalako dance; a winter journey from Gallup, New Mexico, up Canyon de Chelly and Canyon del Muerto; an automobile ride, over roads dreadfully rutted in winter, from Santa Fé to Flagstaff via Kearn's Canyon; a visit to the Natural Bridges in White and Armstrong canyons on horseback from Blanding, Utah; repeated visits to the Mesa Verde ruins in southwestern Colorado and journeys thence south as far as Shiprock, New Mexico, were preparatory to my trips into the less visited rock jumbles of the Rainbow Bridge country. The apprenticeship served a good purpose.

(I shall dwell but little on my first journey to the Rainbow Bridge in 1920. In the main it differs from that of 1921 in that we climbed Navajo Mountain while on the way and that it was over a beaten path. In 1921, fortified by a considerable stock of experience, we decided to find a trail to the Rainbow Bridge to the west and northwest of Navajo Mountain, one I often liked to term the "Northwest Passage," a name borrowed from Sir John Franklin.

My various trips into the desert lands of the southwestern United States, which culminated in the suc-

cessful encircling of Navajo Mountain by packtrain in 1922, were inspired by the blank spaces in geographical maps of this part of our country and the appeal the mystery of the unknown made upon my imagination.) The reader may ask, "Why visit such hazardous land?" The desire to do this is as old as man. This desire led me years ago to take annual sightseeing trips by automobile, then on horseback, and it ended with a real craving to explore, and to endure the hardships that go with penetration into unknown, uncharted regions; taking chances of finding water, food for the animals, passable trails, and a way in and a way out. The charm and lure of exploring, once one yields to this craving, become irresistible. It is real sport, for it develops endurance, abstinence, courage, and skill. The contrast between such exploits and one's daily occupation has an unique attraction. The consciousness that one is wresting unrevealed knowledge from the refractory crust of the earth makes one feel like a conqueror, though a peaceful one.

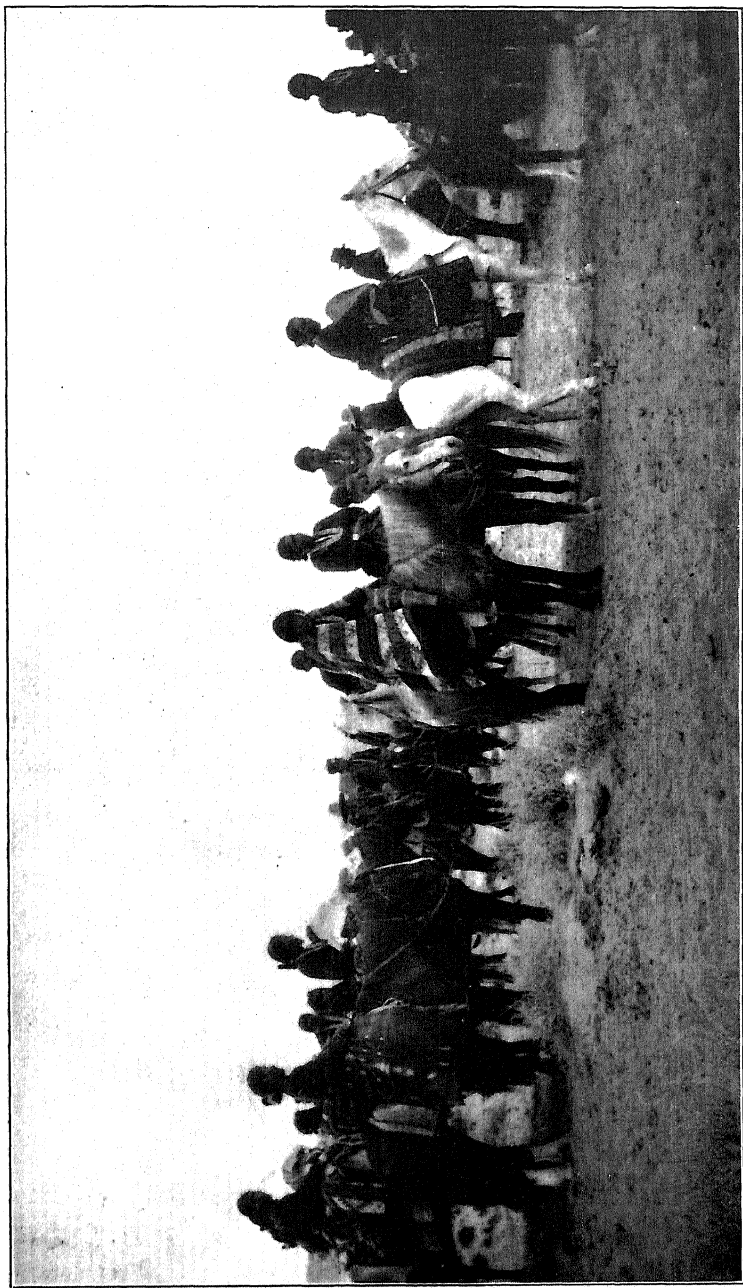
(If the dweller in our congested cities were told that there were hundreds of square miles of the United States which have never been surveyed or even entered by a white man, he would shake his head incredulously; if he were told that no human being inhabits this rugged expanse, he would think of the Indian and would not believe. But he will begin to grasp the significance of the relationship between productive earth and life when he is told that even

animal life here is represented by only a few species; reptiles by snakes and lizards, insects by mosquitoes, bluebottles, wasps, caterpillars, locusts, ants, scorpions, and centipedes; birds by swallows, kingbirds, doves, robins, bluebirds and hawks; mammals by packrats, stray rabbits, and prairie dogs; while the few water-courses near the Colorado River shelter catfish and frogs.

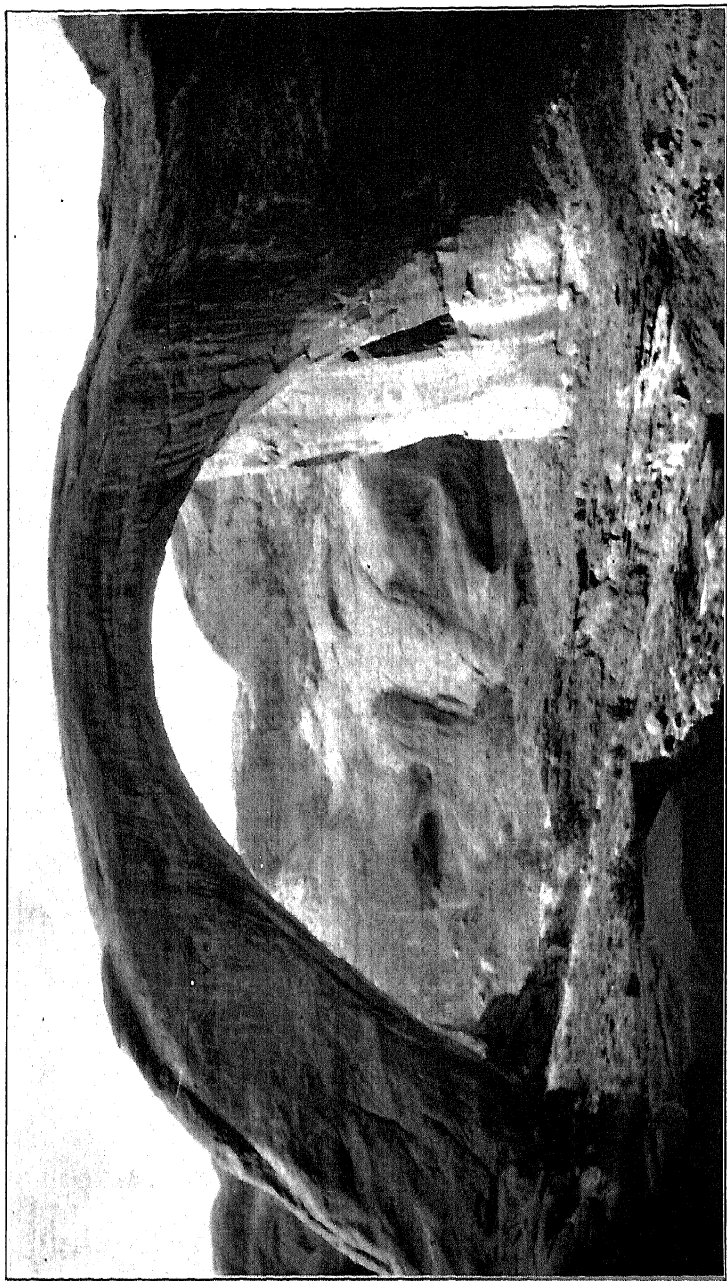
(Where coyote, fox, bear, wolf and puma, sheep and goat cannot find food and water in sufficient or dependable quantity, man perishes.) Subsistence lacks its foundation. (Even the Indian—that primitive type which we usually associate with life in its most barren state, and which can live a week on a handful of corn—cannot here coax from the grudging earth the meagre wherewithal to live.) With this picture in his mind, the uninitiated understands; he may do even more: he may become eager for knowledge of this strange land. Fascinated by what he hears, his thirst for knowledge may even become oppressive.

(This little-known land is located east of the Colorado River, north of Navajo Canyon, west of Piute Canyon. It straddles the San Juan River to the north; it may be said to extend northward as far as White Canyon. The boundary between Arizona and Utah crosses it like an equator. Navajo Mountain, an isolated giant monolith, 10,400 feet high, is its hub, the Rainbow Bridge its jewelled centre.

As all roads lead to Rome, so in the more confined



Women of the Navajo Tribe with their babies on papoose-boards watching the Indian games at Kaibito.



The Rainbow Bridge, 308 feet high and 274 feet between its abutments. Note the difference in stone structure between its base and its bulk.

area of our western wanderings all our roads led toward the Rainbow Bridge. If we had not succeeded in reaching it by the new and apparently impossible route to the west of Navajo Mountain, which we finally found and followed in 1922, it might well be said that we had been "rainbow chasing." In 1920 and 1921 we followed the trail to the east of Navajo Mountain, this being the route originally found by John Wetherill and the Piute Indian, Nasja Bega, when in 1909, while guiding Professor Byron Cummings and Surveyor W. B. Douglas, he discovered the Bridge.

The desert within a radius of one hundred miles of Navajo Mountain is very different from other deserts as we have been taught to picture them. It is neither all flat nor uniformly sterile. It is the "malpais" of the Spanish Conquistadores and the "bad lands" of our frontiersmen. It is the rockiest place imaginable. The plateau of Arizona, Utah, and New Mexico, now five to seven thousand feet above sea level, was originally part of an ancient ocean bottom. At one time it was certainly six hundred feet higher than now, as is indicated by the isolated mesas which have resisted the wearing down of Time more effectually than has the general landscape, which has been eroded by watercourses, now mostly dry, though occasionally re-filled and reshaped by cloudbursts.

Wind, frost, heat, and water have chiselled the rock into fantastic forms. First shallow, then deep, canyons come suddenly into view. I say "suddenly"

because one is unaware of them until almost at their precipitous edges. The sandstone, lime, and shale composing the earth crust here are readily mouldable by the climatic influences of the latter-day geological periods. The Wingate and Navajo sandstone, more particularly present at the altitude of our 1920-1923 expeditions, lend themselves to the formation of grotesque shapes, characteristic of the region. We found arches, some detached and freestanding, as the Rainbow Bridge; others still imbedded in their matrix, or partially freed therefrom, as the one in Cliff Canyon; or out-and-out bridges, such as the three in White and Armstrong canyons, now called Augusta, Caroline, and Edwin, instead of their beautiful Indian names, Owachomo, Katchina, and Sipopu; or egg-shell caves which, when having a southerly exposure, were the homes of cliff-dwelling aborigines. There are also obelisks, pyramids, Gothic spires and shapes resembling men and beasts, more especially elephants and other pachyderms of massive size.

I fully subscribe to the theory advanced by John Wetherill and other geologists that the cross-bedded sandstone in which these caves and arches abound had its origin in ancient, now hardened, sand dunes. No other theory would seem to fit.

Navajo Mountain

Navajo Mountain stands massive and majestic, the commanding, long-distance object of this region. It

fascinates, it hypnotizes, for the eye is constantly drawn toward it. Its shadow-like mass of blue can be seen to the northeast of Desert View, one of the popular motor drives for tourists going eastward from El Tovar. It is a single solid mountain save for a much lower, but similarly shaped, appendix to the east, which we named "Navajo Bega," meaning Son of Navajo. The No Name Mesa, connected with Navajo Mountain to the northwest by what we called the Saddle, can scarcely be considered a part of the big mountain.

From the south one gets the impression that Navajo Mountain is easy of ascent. It appears to be an elongated molehill, well rounded. It isn't that, of course, as we quickly found out when we tried to scale it. The horses and mules had a fairly rough time of it to reach War God Spring, where we camped during the month of May, 1920, some fifteen hundred feet below the top, in the shelter of a glorious grove of yellow pines. We were in a virgin forest amidst a stand of trees that staggered us. Straight as flagpoles, many over one hundred feet high and five to six feet in diameter, these giants towered on a shelf of the mountain. The Indians do not ascend the mountain. They believe their War God lives there and it is to this belief that the beautiful trees owe their existence. Looking east from a rocky ledge, the sunset was a marvel of colour. Monument Valley, the stretch of desert between Agathla Needle and the San Juan River, lay before us, three thousand feet below. Each visible monument

—and there seemed to be no end of them—glowed in an orange-red fire, each bordered on its easterly face by a strongly contrasting blue-slate shadow. The valley was aflame. The monuments looked like shooting jets of fire, their purple-gray shadows like smoke.

✧ But there is no rose without thorns. The mosquitoes were ferocious; the little water pools of War God Spring are their homes. Blood-sucking must be their instinct, for there are no mammals on the mountain. Man comes rarely, but they attacked us instantly. Flowers bloomed on every side, grass was plentiful; but man is restless. That we could go to the top was Wetherill's guess; that we could go over the top was mine. Twenty-four hours later I knew better. The north side has no slope at all, only sheer drops. It was impossible. Another surprise in climbing to the top, a surprise even to the experienced Wetherill, was the presence of snow, deep in spots, melting and slushy. Wet and bedraggled, for six hours we waded and climbed; up to our ankles in the snow most of the time, up to our knees some of the time, all too frequently sinking up to our hips in hidden holes. We lunched on the north rim. I ate my meal standing; being very wet, I feared that sitting still might cause a chill. My menu consisted of some crackers and a box of sardines. Melted snow was the nectar. I not only ate the full contents of my box of sardines but drank every drop of the oil. Nothing ever tasted better! The box was marked (I am quoting from memory): "Sardines in Pure Cotton

Seed Oil. Guaranteed under the U. S. Pure Food Act." I was disillusioned after the act, but this did not influence me in pronouncing it as good a meal as I had ever had. It happened to be the right kind of food at the right time. A little piñon bird fluttered about us while we ate.

Away down in the bosom of the earth, nestling in a dark streak of a canyon, we saw what appeared to be a microscopic half of a ring-sausage. Wetherill had no easy task in making me see this shape. "That is your first view of the Rainbow Bridge," he said. It was no more disappointing than the rest of the landscape which resembled petrified ocean billows; and as ocean billows are said to be the ancestors of this vast sand and limestone country, a close resemblance between parent and offspring seemed natural, and biblically correct.

Four o'clock saw us back in camp.) My toughened friends ignored their wet condition; mine was of deep concern to me, yet prompt change of clothing and an alcohol rub made me as fresh as a young cricket. The fatigue had disappeared and I closed my day with five or six pages of field notes. The air, the altitude, the sane life in the open, are true and trustworthy physical and mental fatigue chasers.

The serious problem which I had to solve that evening related to my shoes and leather leggings. Their snow soaking had made them limber as a squid, but after drying near the fire they had become as rigid as

dried salt cod. Someone suggested a plentiful application of bacon grease and it was successful. I heartily recommend this to other tenderfeet. Wetherill's problem was my kodak. The shutter would not work, could not be made to work; it had apparently stopped working some time since. We remembered that Wetherill had slipped, carrying the Kodak with him, as we came down the Keetseel Cliff Ruins. Time exposure with the help of a black stocking, or no more pictures, was our choice. We took the former, and the best and clearest pictures taken on any of my journeys were the result of this method. Nevertheless, I recommend that not less than two, and possibly three, cameras be part of every outfit. As a large number of pictures are taken from the backs of horses or mules while in motion, necessarily resulting in many failures, the supply of film rolls should be proportionately great. I carried between three and four hundred exposures on both my 1921 and 1922 trips. I have never regretted this apparent extravagance and encouragement to carelessness. The pleasure to be had from such permanent records as pictures, as well as their educational value, is ample compensation.

Concerning the Outfit

In addition to the things which may spoil any journey, there are no end of happenings which can blight a desert journey. Barring unforeseen accidents, success on the material side depends upon the men com-

prising the outfit, the animals, food for man and beast, camp and medical supplies. On the other hand, there must be definite planning, a fixed objective, and, above all, the relationship between the units must promise peace and harmony.

Once the packtrain has started it is akin to a boat-load of living beings, self-dependent, a physical and social unit almost a law unto itself. First the leaders and helpers are men of the desert, individualists, with definite, almost ironcast, notions of the proprieties, of the ways and means to be used to solve the problems constantly cropping up. Many of these problems cannot be foreseen or provided for. Above all, the frontiersman is a thinker; while he whittles a stick of wood into a toothpick he analyzes, reflects, sets his mind. He looks before he leaps. The men whom these leaders guide also have their habits, tendencies, and idiosyncrasies, and the elements thus assembled must be made to blend and harmonize, to supplement each other. There must be mutual esteem and respect. I emphasize this because it controls the happy outcome more than do proper foodstuffs, medicines, or skilful planning. Certain well-defined principles of conduct must be promptly established, or else chaos reigns. If confidence and harmony are lacking, a thousand and one jarring occurrences will quickly fan discord into flame, and wreck the whole enterprise.

Fortunately on all of our journeys my relationship with my guides and between these men and myself

could not have been better. Each man had his particular duties assigned; but when these were too heavy the other men unhesitatingly put their shoulders to the wheel. There were times when each found himself doing any and all work. There was no eight-hour day. Now and then we found Wetherill, and even Al Smith, doing the cooking; then again all took a hand without spoiling the broth. Yet it was Johnson to whom this particular duty was assigned, he being decidedly the best cook. I agreed with the selection, with one reservation: I stoutly declined to eat his biscuits. I had partaken of these delicacies several years ago and had then and there resolved to have no more! Johnson was somewhat touchy about this, especially when he saw me eat, apparently with much enjoyment, the bread which we had brought with us. This bread, besides being dry and hard, had earned the classic name of "Pavanazzo Marble" because of the black and pink veins of mould which adorned it. Johnson's touchiness had to be overcome. An opportunity presented itself at our camp on Beaver Creek. As my contribution to the stories of the evening, I related an incident which had occurred that morning and which concerned Billy, my horse, a great pet of Johnson's. He owned him, and to Johnson's mind, anything Billy did was all right. When we broke camp at War God Spring we left some pieces of biscuit strewn about the ground. I offered some of these to Billy but he disdainfully turned his head. When, however, I showed him a bit

of "Pavanazzo Marble" which I had in my pocket he smelled it, snatched it, chewed and swallowed it with delight. Johnson was satisfied. Billy had closed the issue between Johnson and myself.

Another breach which had to be adjusted was this: Wetherill and Johnson, both high-class men, both guides *par excellence*, were equally fitted to command. Yet it was impossible to have more than one leader. The matter had to be settled early and settled right. As a precedent I quoted Sir Walter Raleigh's reply to Queen Elizabeth, who ever ready to embarrass Sir Walter, asked him, in the presence of Mary, Queen of Scots, which of the two was the better dancer. Sir Walter, fortunately for his head, kept it cool (and where it was to remain for a little while longer), and replied: "In Scotland Queen Mary dances best, in England, Queen Elizabeth." Luckily this stray story was an inspiration. It enabled me to apply its philosophy to the situation before us, by pronouncing Wetherill the best guide south of the San Juan River, Johnson the best guide north of it. This made Wetherill the leader, for we were south of the San Juan.

A gale was blowing when we reached Surprise Valley, made famous by Zane Grey's book "The Rainbow Trail." One of the men started a fire; several of us asked him to stop. He persisted, however, and before many moments the dry leaves between the trees south-east of us were on fire. For over an hour, when an acre of ground had been burned bare, we fought the

flames with shovel and sand. Soon after another fire started, and this, too, we controlled and finally smothered. The tension among the men was intense. They all knew whose fault it was and also that he had been warned. I knew that if I could prevent them from talking, and could do this long enough, the spark—in this case the spoken word, but as capable of starting a fire—would die out, and with it the incipient conflagration. I planted myself among them and choked all conversation by rudely interrupting and interjecting irrelevant remarks. Without their realizing it, the trick worked. After a hearty but uncooked meal, the *status quo ante* was reëstablished and Johnson's cheery songs made us forget.

On another occasion discord was ready to break out, but fortunately I was able to control it by a private and quiet remonstrance with my friend Johnson. We were crossing Monument Valley from Kayenta to Goodrich, on the San Juan River, where cowboys had built a primitive sort of bridge across that temperamental stream. At six P. M. (this was the first night out from Kayenta) we reached a rock defile where there should have been water, but where none was to be found. Wetherill said that about three miles farther on, about an hour's travel, he knew of a likely place. On we travelled, but all we found was a hollow tree containing a few cans full of green scummy water, which had been covered by the Indians with stones to prevent stray horses from getting it. It was suf-

ficient for cooking a single, very meagre meal. The next water was a long way off, it was night and in the month of July. How about the animals? We had eight or nine. Johnson, our quick, brilliant, yet gentle friend, who was under great tension, kept mumbling: "But my horses cannot do without water until noon tomorrow, or later."

Wetherill, who never spoke more than twenty-five words at a time, felt what was on Johnson's mind and coldly remarked: "A desert horse can work without water all of twenty-four hours."

Johnson coolly rejoined: "Mine can't."

"Mine can," Wetherill said.

Right here was the dividing line between the viewpoints of the two men. Johnson's horses were well cared for, fed on alfalfa and corn at Blanding. Wetherill's horses were left to shift for themselves, to fight for their very lives in the lonely oasis of Kayenta. "Love me, love my horse," was the issue. Both men were brooding. There was not a blade of grass, no willows, no scrub oak, no thistles, not even sage worth mentioning. A moving sand dune had well nigh choked the meagre vegetation in the cove where we camped. The animals kept close to the campfire; they seemed like creditors reminding debtors of their matured claims.

Suddenly out of the dark two Indians stepped noiselessly into the bright campfire circle. There were no greetings. Some moments elapsed before a word was

spoken. Then began a long confab in Navajo between Wetherill, Johnson, and the Indians. It seemed as though it would never end. Until the conversation started I had felt most uncomfortable. I feared the Indians had come to ask us for an accounting of the theft of the two cans of "green paint" which we had taken out of the hollow log. It was treasured by them, as was shown by the precautions they had taken to cover it with stones. Wetherill, always game and calm, gave no indication of what the talk was about. Johnson looked cheerful. Indeed he rarely looked otherwise; the more adverse matters became the more he chattered and sang. Water and horse feed for a dollar, that night and the same in the morning, was the bargain they made with the Indians. It was our camp-fire and the prospect of some food which had attracted them. After eating the remnants of our own supper, the Indians proceeded to round up our animals, and next morning we had happiness in every face, for our faithful, hard-working, mute friends looked contented, and so did Johnson. Where a white man fails an Indian can always find water. But there had been a narrow margin between harmony and discord the night before.

Incidents similar to this are likely to occur on such expeditions. They represent a crisis which, if it does not solve itself, must be tactfully handled. The alternative is so distressing that it is worth every effort on the part of the organizer to make himself respected

and even loved, so that for his sake and in deference to his wish, whether right or wrong, goodfellowship will be maintained.

But the organizer is on trial as well from the moment he meets his travelling companions. They promptly size him up, and more or less crudely try him out. In the main, they wish to learn whether he has courage and endurance, whether he is a manly man, a "square good fellow," their equivalent for a gentleman. He must make good. Johnson sounded me out in 1919; Wetherill in 1921. The second day out, after being in the saddle for seven hours, Wetherill, addressing the men, remarked: "I suppose Mr. B is ready to drop off." Of course I was almost in, but promptly rejoined: "Nothing of the sort. I am good for ten miles more." (The equivalent of three hours' travel.) At another time I did not relish climbing the bare, very steep approach to Keetseel Ruin; but, tied to a rope, I did not dare show the white feather by giving in. It impressed my companions, as did my stubborn refusal to dismount at difficult places until they did.

Johnson's method had been different. I first met him in Blanding, late one evening in 1919. I told him that my time was limited, that an early start the next morning for White Canyon was imperative. He informed me that unfortunately the supplies in the local coöperative store were low, and that for my comfort it would be better to wait until they had been replenished. I replied: "Of course if you are afraid to start with such

supplies as are available, we shall have to wait." His prompt reply was: "Not I," and this was followed by my equally prompt rejoinder: "Nor I." His respect was won and kept. But my bravado might have had disastrous consequences. We left and came back to Blanding on schedule time and in prime health; yet we had neither bread nor potatoes, no jam, no meat substances (save one jar of chipped beef), no butter, no other fat. We lived happily and contentedly on the journey, having coffee, Heinz's kidney beans, canned pears, dried prunes, and a very few crackers. To the uninitiated it seems strange how little is sufficient for a white man. No matter how plentiful the supplies may be at the start, at the finish short rations all around are the rule. For where one can of tomatoes will serve the requirements, the men invariably open two; where a handful of biscuits would be ample, they cook enough to leave some on the ground when camp is broken. At each meal they eat as though it were their last and, what is worse, they waste. The reason is not far to seek; it is a natural tendency of the men to be improvident at the beginning of a journey. They begin to lighten the load as early as possible. On one of the journeys my last meal consisted of a handful of seedless raisins, a bit of cracker-dust, and hot water; yet each time we pulled through and returned in good health. I speak of this to post any travellers who on their first trip may generously encourage lavishness rather than attempt tactfully to check it.

In the Appendix will be found a list of food supplies which experience has taught me are conducive to comfort and health, are palatable and not too bulky for transportation. A fair selection of food is provided. Starch, meat, sugar, fruit, and vegetables. Some of these I shipped from the East, in sufficient time to permit an acknowledgment of their receipt at destination before I started West, so that I might be in a position to replace them if they had failed to arrive.

Kayenta

(In) 1919 (our start) was made at Blanding, Utah; in 1920, 1921, and 1922 at (Kayenta, Arizona,) and in 1923 at Durango, Colorado.

(Without sleeping bags and without tents, depending for shelter from rain on the tarpaulins which cover the animals' packs, we left the engines of railroad travel. I shall chiefly describe the journeys which radiated from Kayenta.

Kayenta is a settlement one hundred and sixty miles north by east of Flagstaff, a station on the Santa Fé Railroad. The trip from Flagstaff to Kayenta by automobile is through beautiful yellow pine forests, past the snowclad San Francisco peaks to the west and Sunset Mountain to the east.) The latter owes its name to the fact that at all hours of the day it looks as though its top were illuminated by the rays of the setting sun. This effect is produced by the red volcanic cinders which cover its russet summit.

(“Bad lands” in plenty are traversed; lands where no vegetation can grow, lands literally covered with sea-beach jasper or lava, and then again carpeted, densely in the springtime, with acres of the beautiful, but dreaded, poisonous weed, the loco. Between the north bank of the Little Colorado and the rocky ridges beyond, the Painted Desert glows in delicate beauty. At Moencopi Wash miles of sandstone, spotted leopard-like in brown and cream tones, dazzle the eye. No moment of the ride from Flagstaff to Kayenta is tedious or tiresome, but the sun and dry air sometimes produce skin irritation on those unaccustomed to it, and moistening the hands and face with some oily substance, such as lanoline, is advisable. I found it desirable to do this for several days, after which it became unnecessary.

☞The loco weed is the siren of the West in flower form. It is an attractive little flower. The colour of the blossoms varies from white to deep magenta, and the delicate tracery of its leaves, resembling those of the locust in miniature, is exquisite. Horses and cattle, those instinctive botanists who are more reliable than most humans in distinguishing one plant from another, avoid the loco if there is anything else to nibble at, though I was told that the loco is not particularly harmful to them if but little is eaten, provided there is no dearth of water. Eaten in quantity, with no water at hand, the animals become “locoed,” that is, go crazy, and die. One of the symptoms of this trouble is a

bushy, irregular growth of the animal's hair. I wonder that some of our hair specialists do not investigate this vicious virtue of the loco, with a view to discovering a hair tonic to cover bald heads with a new and robust growth.

(The journey between Flagstaff and Kayenta can be made in ten hours by automobile, but stops for water and rest at Cameron on the Little Colorado, at Tuba City (an Indian station of the United States Government, and formerly a Mormon settlement), and at Red Lake, prolong the time. Shovelling the car wheels free from the sand which frequently blows over the road may delay the journey an hour or more. At Cameron, Tuba, and Red Lake, as also at Kayenta, the commercial relations between the Indian and white men are in the hands of licensed traders. It is but a meagre livelihood that these men at the outposts of civilization eke out. The Indian's wants, of course, are small.) He comes riding in on his broncho—the rein often a bit of rope—he sits his horse loose-jointedly. If he is absent-minded, or unusually tender-hearted, he swings his outstretched arms to urge on his horse. A black velvet jacket or shirt (it is hard to define it) is a favourite garment for man, woman, and child. Instead of a hat he places around his head a bit of cloth rolled into a narrow band. This keeps his long, coarse, straight black hair from blowing. If the weather is cold, he arrives wrapped but shivering, in blankets of gay colours, woven by Eastern mills. He usually wears soft moc-

casins instead of shoes. The balance of his clothing consists of anything and everything.

The Navajos live a lonely and semi-nomadic life; they do not congregate in villages like the Hopi, Zuni, and Pueblo tribes.

At times when the Indian comes jogging in he carries a bundle over his pommel. It may be raw wool, dried skins of goats or sheep, a few bags of piñon nuts, or even some Navajo blankets, woven in his *hogan* (home) by his squaw and children.

The Indian trader throws the wares on a scale and, after ascertaining the weight of each item, pays for them, preferably in silver dollars. The Indian then loiters in the store, hardly ever speaking, looking at the shelves of merchandise from across the counter. Time, to him, seems of no value. Finally he points to some calico. He buys several yards; he also buys unbleached muslin, some velvet, candy, coffee, tobacco, and flour. If he is short of money he may pawn some of his silver trinkets—the Indian trader being also a licenced pawnbroker, operating under the most stringent regulations, by which I have always found him abiding, strictly and conscientiously. Finally the Indian goes as he came, noiselessly and shadow-like, without noticeable leave-taking.

The Indian that I have described is chiefly Navajo, with some intermingling of Piute through marriage. As a rule the Navajo men are tall, lanky, and good looking. The women are less attractive. These latter

wear skirts, cut and gathered in pleats very much like those of the Spanish or Mexican peasant women. The children are angelic. One's heart goes out to these well-mannered and beautiful little classic bronzes, with their deep brown eyes, intelligent and questioning, wandering in the trader's store. In fact, even the grown-ups appeal to one's sympathies. They are so childlike in their trust and belief.

I remember a strange and interesting incident at Mr. and Mrs. Wetherill's home in Kayenta which might well furnish food for thought. I was in their curious, den-like living room, talking to Mrs. Wetherill. Their front door has no key and no bolt, so secure do these people feel in their surroundings. Suddenly, without knocking, an Indian stalked in. He was a splendid specimen of humanity, six feet three inches, or more, in height and a bit gray. Silently he stood before us for some minutes. I do not know whether he or Mrs. Wetherill spoke first; then for a half hour at least they conversed in the soft, melodious Navajo tongue in slow measured sentences, which reminded me of words which might have been spoken on the ancient classic stage. Time seemed no object. In slow cadences each word followed the preceding one. Finally Mrs. Wetherill left the room but soon returned with a woollen blanket, a leather moccasin, and a wooden arrow. With his knife the Indian cut a strand from the blanket, a fringe from the moccasin, and a chip of wood from the arrow, and without thanks or word of leave-taking, unemo-

tionally, yet indicating no lack of gratitude or respect, departed silently as he had come.

Realizing that I was eager to know the meaning of this visit, Mrs. Wetherill explained that the big Indian was a Medicine Man who had come to tell her that a woman of the Piute tribe, who had married a Navajo, was desperately ill. He expected to cure her, and for that purpose had come to get some objects of Piute origin—a bit of wool from a blanket, a chip of wood from an arrow, and a fringe from a moccasin, with which to compound a medicine to cure a woman dying of tuberculosis!

Next day Mrs. Wetherill and I went to see the patient. We found the poor woman, baby in arms, haggard and dying. A package of cough drops was all that we could give to ease her. Poor woman, poor child, poor husband, and poor everyone else living in that hogan! Unless absolutely immune they are all doomed to go the same road prematurely for lack of proper care. Moccasins scarcely seem the proper medicine for consumptives in this enlightened age. If only this little anecdote might fall seed-like into its proper place, sprout and produce a desire to give these helpless, childlike Indians proper and timely medical aid without too much red tape!

(The pleasure of a visit at Kayenta is enhanced by the opportunity for conversation with Mrs. Wetherill, whose knowledge of the Indians in the Southwest, especially the Navajo, Piute, and Hopi, their language,

customs, ceremonies, and traditions, is not equalled by any other white person. Unfortunately, her writings have not been published because of the lack of outside support which is essential, and they are likely to perish with her unless someone comes along with the necessary understanding and ability to supply the missing link in this chain.

Mrs. Wetherill has collected more than three hundred varieties of desert plants which have been identified by the University of Arizona and the New York Botanical Garden. She has worked among the natives for many years. She has won their complete confidence, I might even say their love and affection, and has thus been enabled to learn from them the Indian names and medicinal uses of all these plants, and the ceremonies accompanying their administration, as well as the chants sung while these medicines are being compounded. What an opportunity for the advancement of general knowledge and perhaps even medical science, if only someone would wake up to the value of the treasures here collected, someone who would be sufficiently interested to go there, or send a dependable representative to investigate and report his findings. Soon the native medicine man and the older generation of Indians will have died out, and practically all that is worth while in the medical culture of the Navajo will have passed on and been lost for ever.)

The Indian men, women, and children are all fond of

silver ornaments. These are ingeniously and artistically beaten out of silver dollars by their own silver-smiths. They have rings, ear-rings, buttons, bracelets, or necklaces, ornamented at times by blue or green turquoise. Many wear elaborate necklaces composed of turquoise, sea-shells, black gilsonite, and wampum.

The Chicken Pull

The finery exhibited by the Indian men and women on festive occasions is naturally an exaggeration of what they ordinarily wear. I had a splendid opportunity to view them in gala array at a large gathering at Kaibito—some of the men in my party called it “the end of the world,” for north of it is the very inhospitable country we penetrated in 1921 and 1922. The gathering was made the occasion for a “Chicken Pull.” Government agents took advantage of the presence of four to five hundred Indians, including their squaws on horseback, carrying their papooses on baby-boards, to deliver to them a message from the White Father in far-off Washington. The celebration was started with a saddle race. It consisted of young braves mounting horses without bridle, blanket, or saddle, racing some distance to a spot where bridles were scattered, dismounting, bridling their horses, then racing farther on to a spot where blankets lay ready to be snatched up, and then still farther on to gather up a saddle at another spot. The first to arrive at the starting point, fully equipped, was the winner of five dollars. Then

followed squaw races. The women rode as well as did the men.

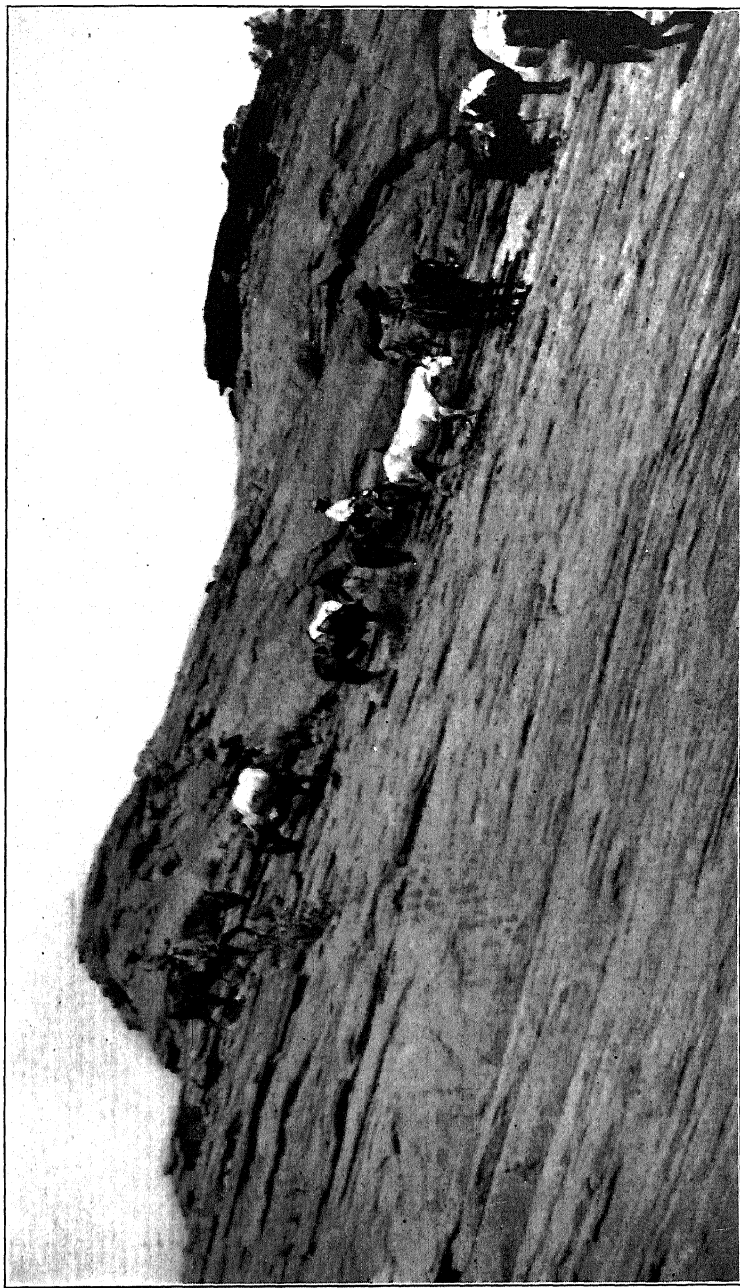
The *pièce de résistance* was the "Chicken Pull." The name is derived from an ancient, cruel custom of firmly burying a rooster in the sand with the neck and head protruding. The participants in the game would gallop past it and try to pull the poor bird out of its prison, and, of course, out of its misery. As often as necessary the bird would be replaced until one lucky and able brave could pull out its full body and thus be pronounced the winner. All there is left to-day of a "Chicken Pull" is the name. Humanity, self-interest, and invention have triumphed. A gunny bag, full of corn, now replaces the rooster. The end protrudes from the sand and is the objective of the racing, battling, and crowding youths. Fifty or sixty men took part and galloped past the buried bag for an hour, throwing each other in their eagerness to get hold of the protruding end and pull it out. The horsemanship, though crude, was wonderful. The litheness and automatic muscular control of the rider, bending down to the earth and hooking his weight by one leg, were phenomenal. The winner earned fifteen dollars. Two umpires controlled the game.

The finery and the trappings on these occasions are barbaric in their beauty. The gaily-coloured blankets, in which many Indians wrap themselves, and the conspicuous saddle blankets attract first attention. The Indians' moccasins are adorned with silver buckles, their

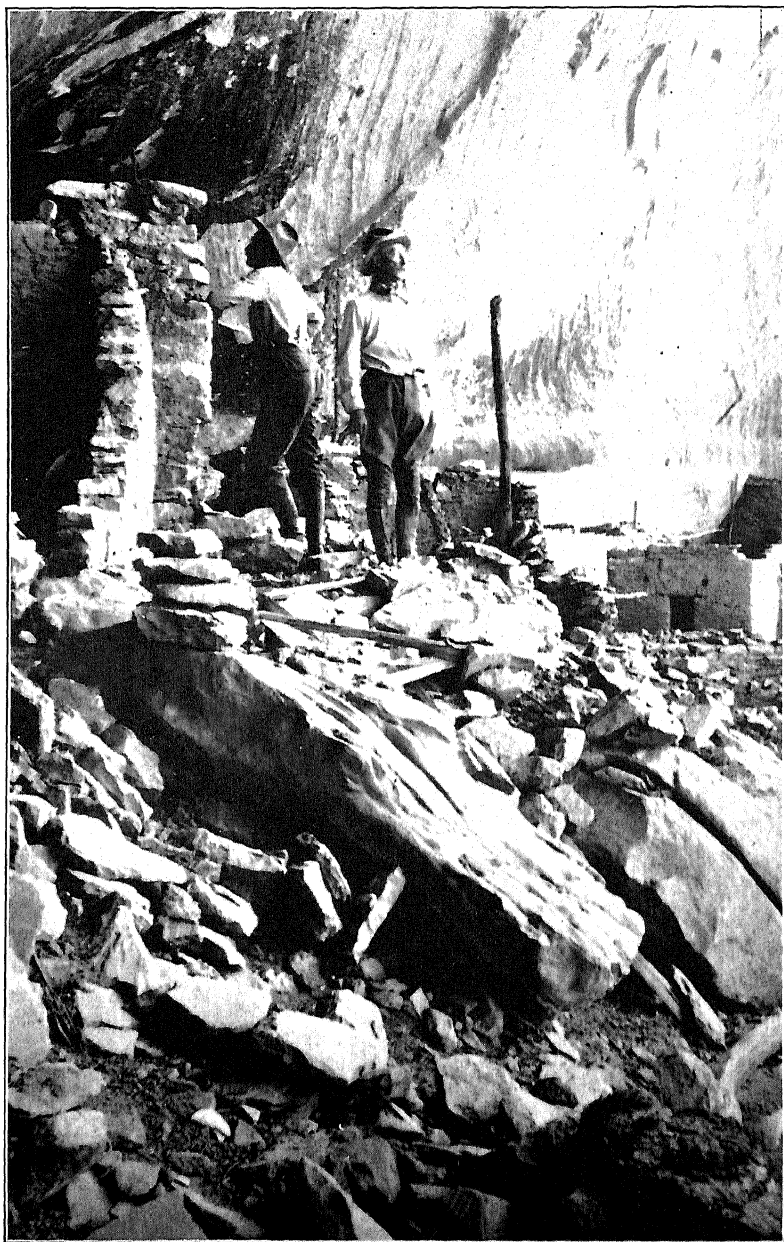
trousers are ornamented with side bands of silver buttons, their sombreros are silver-mounted. These are the less conspicuous ornaments. They are eclipsed by the heavy belts of leather studded with oval silver plates, four inches long and three inches wide, with large buckles of the same material, silver spurs of unusual size, bridles and embossed leather saddles studded with silver at all ends.

One of the freaks of nature I noticed at this celebration was an albino Indian. His hair was flaxen, his skin Caucasian in its bleach, and his eyes pale blue with a pinkish hue.

An amusing incident was the result of this visit. Some eight or nine of us took luncheon in the room of the Indian Agent. There were no chairs. We all squatted on the floor. None of us, however, paid any particular attention to the matter and it would have been entirely forgotten, but months later a newspaper was sent me containing this reference to the occasion: "Can you imagine the guests of honour squatting on Navajo blankets spread on the floor of the Indian Agent's home and Mr. Bernheimer, the multi-millionaire shirtwaist manufacturer from New York, drinking his coffee out of a tomato can and, despite its jagged edges, looking happy and cheerful?" The coffee and tomato-can incident is true, but the rest is a yarn no doubt permissible from the newspaper point of view. The primitive West is ready to make a multi-millionaire out of every visiting New Yorker, but on what ground



One of the many spots on the trail where a stampede would prove fatal. The disabled white mule is having his vacation.



The centre portion of Betatakin Cliff Ruins.

the writer has based the "shirtwaist manufacturer" I have never been able to learn.

The Wetherill Home

(The Wetherill home at Kayenta deserves description. It is a neatly joined one-story structure of stone covered with Virginia creeper. A small group of lusty box elders on a fresh-looking grass lawn, freely watered and carefully tended, is a grateful contrast to the yellow and salmon-pink sand and rock waste surroundings. So proud are the Wetherills of their lawn that the most prominent object on entering their grounds is a sign, "Keep off the Grass." Refined people live in this little desert home, refined in manner and conversation, in the decoration of their rooms; there is an atmosphere of refinement everywhere. Rare Indian relics give a den-like look to living room, hallway, and bedrooms. The dining room has painted friezes along its sides, replicas of the "sand paintings" of the Navajo.

The settlement at Kayenta contains another store, the missionary's home, and an Indian school building. The most outstanding structure is a windmill, not the Holland type, but the iron spider-web-like skeleton we meet in Kansas.) By happy chance the local missionary, a man named Smith, beloved and respected by everyone in Kayenta, had planned a gathering of some forty or fifty Indian boys and girls at his home on the evening of my arrival in Kayenta. When I saw him

he seemed to be troubled and shortly before supper time unbosomed himself. His trouble was that he had the piano and a book of religious songs but no one to play the accompaniments, and he wondered whether I could help him out. To my sorrow, years of neglect had made my playing rusty, but I agreed to do my best for him. The room was lit by a single oil lamp; it was jammed full, for not only the Indian children and youths turned out, but every grown-up in the settlement was on hand as well. The clinking rattle of the piano (its keys filthy and sandy), the poor light and stifling atmosphere, were forgotten in the divine sincerity that enveloped the rough-and-ready "soul-coral" that evening. There were gathered Jew and Gentile, Mormon, Quaker, and Polytheist, but all were enraptured by a single thought, each was speaking to his Creator in his own way. On that evening I believe I was lifted more nearly heavenward than ever before.

This brings to my mind another gathering, quite different, yet so intensely sincere, that even though it took place elsewhere I may be pardoned for recording it here.

Bluff

John Wetherill and Al Smith parted with Johnson and myself at Mexican Hat, Utah. They were returning to Kayenta, while Johnson and I were to proceed to Blanding by way of Bluff, a Mormon settlement of about one hundred and fifty souls, on the San Juan River. Our two days' trekking on horseback, from

Kayenta to Mexican Hat, had been trying for all of us. Johnson and I reached Bluff at about four o'clock.

I was quartered at the home of Mrs. Pearson, and while sitting on the porch, drinking one glass of hot water after another, to replace the body moisture which had evaporated during our hot journey, I was addressed by a venerable-looking gentleman. He introduced himself as Bishop Jones, the civil and religious head of this little settlement, and asked me whether I would consent to speak to his flock that evening. He assured me of their interest, indeed their intense interest, in any subject that I might bring up, as strangers rarely visited the town, and contact with the outside world was rare. We determined that the subject of the address should be "Arbitration", a theme particularly appropriate as all the government, judicial and otherwise, was on the patriarchal basis of the forefathers, the Bishop being arbiter, judge, and father of all his flock.

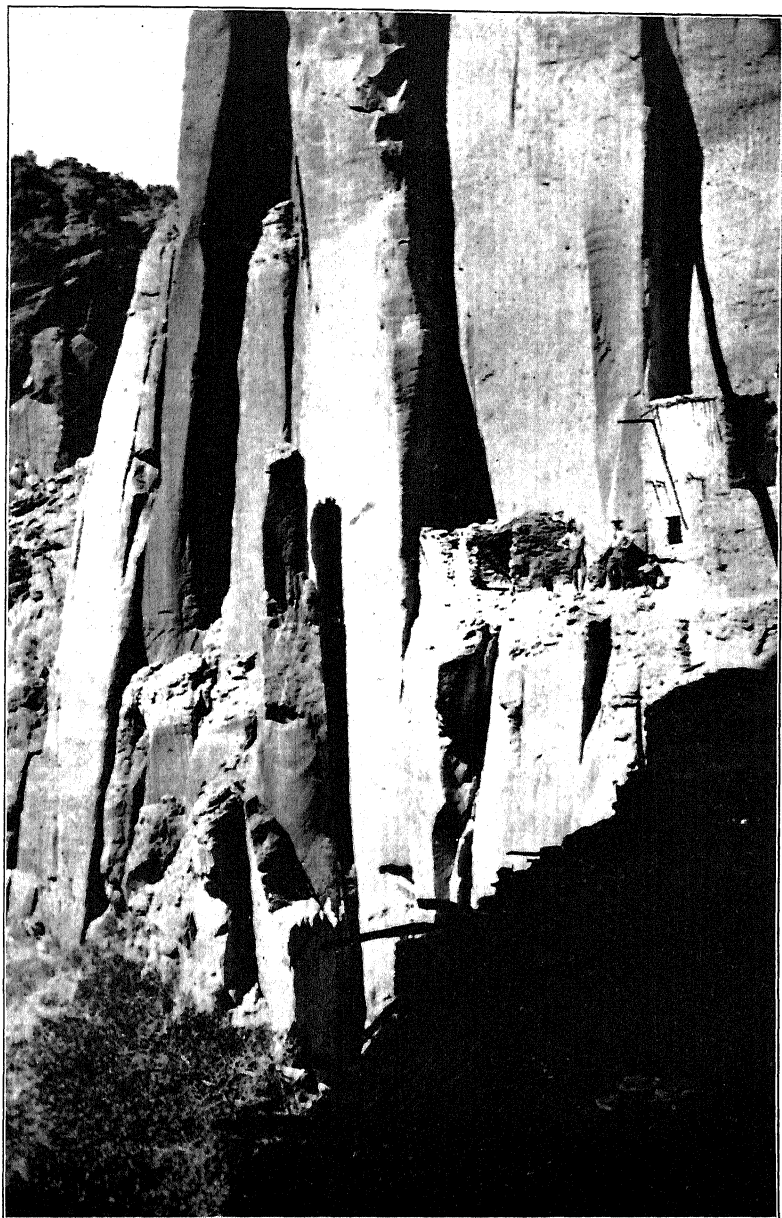
The gathering was arranged for eight o'clock that evening and was to be on a lawn next door, oil lamps to supply the light. The men were few, most of them being with their cattle up on Elk and Blue mountains. Women and children crowded in and sat on benches, or on the grass. There were but two chairs; Bishop Jones, solemn and kindly, with a year-old baby in his arms (the symbol of Mormonism) occupied one chair and I took the other. The function was opened with patriotic songs. The Bishop then addressed his

people and finally introduced me. His words were unusually warm and hospitable.

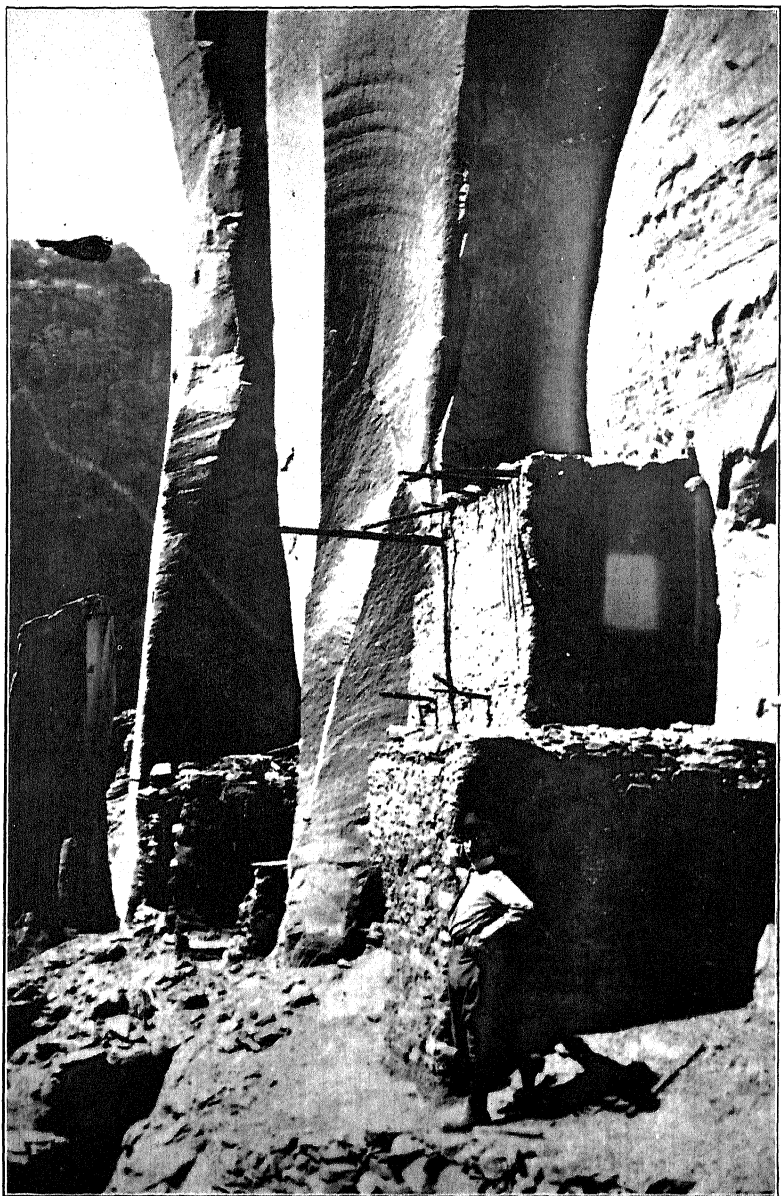
After I had finished I urged the audience to question me freely, feeling certain that some of my remarks needed further explanation. A little gray-haired lady, whom they called Aunt Mary, arose and said gently: "Will the kind stranger tell us when the price of sugar will come down; our fruits are ripening and we are without sugar to can them." It was July, 1920, and the mal-distribution of sugar had produced a deplorable condition. Little Aunt Mary had hit the nail on the head. Arbitration and other world questions were important but academic and quite secondary to her circle of vision. The inner man is a double; he is spiritual, but on the material side most insistent. These poor frontier housekeepers had no mean burden to carry to make both ends meet, and Aunt Mary was right in shifting the discussion to the actual needs of the hour.

The Preparation of the Packtrain

(To prepare a packtrain requires both skill and experience. Poor judgment will mar an enterprise at its very inception. Animals fit to do the work must be found, their bridles and saddles must have been conditioned in advance. Extra supplies of shoes and nails are essential; the quantity and quality of feed must be carefully selected; the choice and quantity of food for the men, and finally, the distribution of the whole in the packs and panniers, together with clothes, supplies



The westerly edge of the Betatakin Ruins. The ancient stone houses nestle in the rock recesses as though built by swallows.



A near view of the westerly edge of the Betatakin Ruins. They are about one hundred to one hundred and twenty-five feet above the Canyon bottom. Note the cedar beams supporting the floor and roof.

Makers, here found solid ground of proof for their earlier conjectures.

Betatakin

Our night camp was to be pitched near the Betatakin Ruins, in one of Sagi's side canyons. The trail there is easy and leads through a fine, heavily timbered oasis-like valley, which has good water. We slept in a piece of oak woods, by the ruins, and had no regrets or disappointments in our second visit to one of the most beautiful and picturesque cliff ruins of the Southwest. Its westerly edge, especially, has great possibilities for painters and photographers because of the pillar-like conformation of the rocks and the cliff-houses nestling in their recesses. The Gothic cathedral builders of the Old World must have had visions of something akin to this when they built their low chapels in the recesses of the buttressed supports of their main edifices.

On the rock face of the easterly side of Betatakin Ruin is a large disk into which has been scratched a picture of the Navajo War God, a straight-shouldered cubist design resembling a four-legged lizard rather than a deified man.

From Betatakin back into Sagi Canyon, up its sides, thence over a level plateau and down to Shanto—which in Navajo means, "water on the sunny side of the rock"—offered no special difficulties.

The water at Shanto was very good, as was also the feed for the animals. The poor things, which in fat years graze so free, now found, because of the drought,

scant chance for nibbling by the wayside—no wild beans (Lupine), no blue grass tufts, no willow tips; nothing but bitter sage, grease bush, or scrub oak, stray and rare bits of wire grass, the dangerous spear grass and the scanty gama grass.

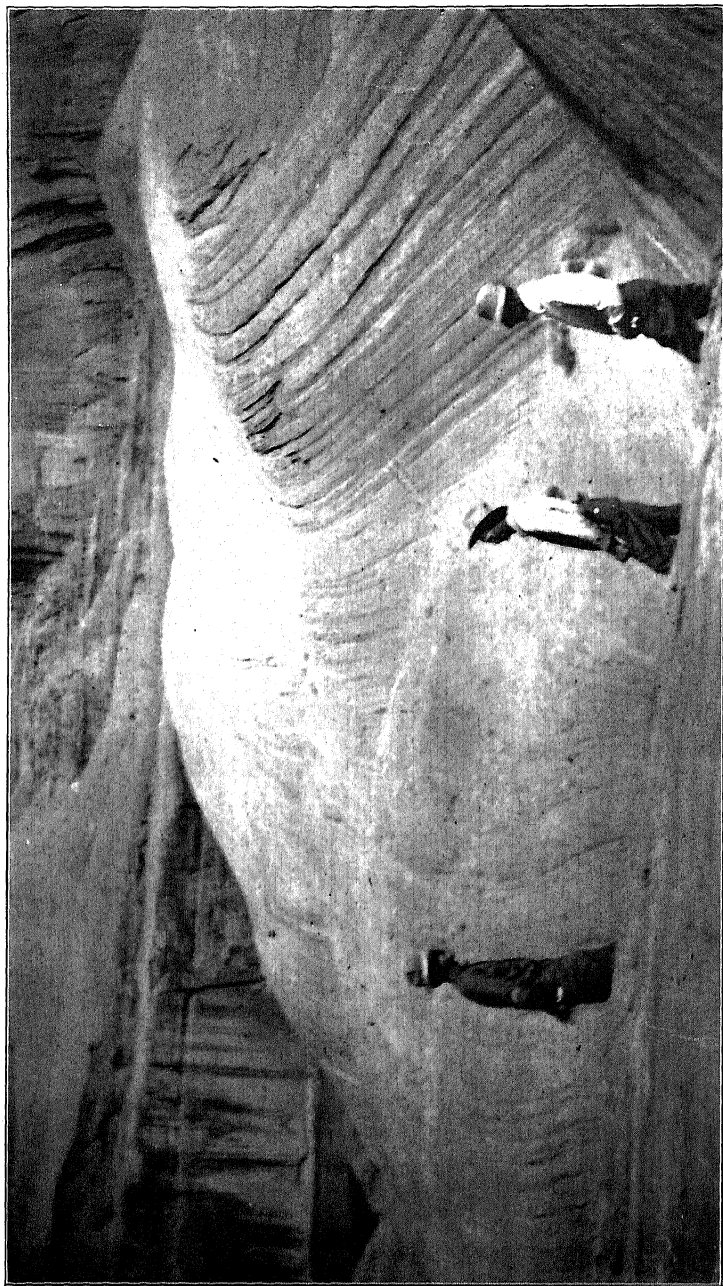
Although the evening had been warm and sultry, it turned very cold in the early morning and I had to get up to fetch my night-cap—the same old red skating cap which had done such good service out here in previous years. We had expected rain, so all our belongings were covered with canvas and made fast; but none came.

In an Indian trading post at Shanto, the last habitation of white people to be met before our return to Kayenta, we increased our none too plentiful stock of food by the purchase of all the bacon which was to be had, and secured, in addition, a pair of shoes for Al Smith, some pottery for the American Museum of Natural History, a riding whip for my good horse, Old Reliable, and some calico for dish cloths, which later proved to be printed in “fast-running” colours.

A sand dune, one hundred feet or more in height, had choked the exit from Shanto. The climb over it was trying because the morning sun was hot and the sand so loose that it often reached halfway to the horses' knees. A long, long endurance ride on the desert floor, for hours in sight of Navajo Mountain to the northward, brought us to a huge, smooth, red sandstone cliff literally covered with pictographs. These were representations of snakes, sun dials, spirals,



The "Gooseneck" of the San Juan River. The savage stream enters the amphitheatre and sweeps around the crown-shaped centre. --Exit and entrance are separated by a rock neck not over 10 feet wide.



These rock masses close the mouth of Sirocco Pass. They form the southeast shore of the Colorado River, seen in the dark triangle at the left. The wall-like rocks border the Colorado's northwest shore.

goats, cows, and horses, the latter two of Navajo workmanship. Some of the goats had zigzagging tails ten times their length, with what looked like balls at the ends. Another figure, which was particularly noticeable, was a goat upside down. At one point, above some eyelets cut into the cliff, to which roof beams had once been lashed, there was a deep slanting groove, evidently intended to divert drippings from above. For four hundred feet along the base of the cliff there was evidence of the previous existence of ancient buildings of the two-story type. A rock fall had destroyed and covered them.

At about noon that day, June 30th, we reached the brink of Neetsin Canyon, in which, near its junction with Navajo Canyon, Inscription House is situated. This canyon has absolutely bare sides, and to get down into it was a most awkward task. The slant of the trail, where there was one, was very steep, and where we travelled without one, it was anything but agreeable. Everyone picked his way afoot, even the Navajo helper dismounting, which is significant, for it is well known how reluctant Indians are to walk, especially when there is a horse at hand. We descended safely and reached a camping place in Neetsin Canyon, near a good spring and plenty of grass.

Inscription House

After lunch we rode to Inscription House, a cliff ruin of perhaps seventy-five rooms, situated a hundred or

possibly a hundred and twenty feet above the canyon bottom. With the help of a rope and much determination I got up to it, watched over by Wetherill, Johnson, and Morris, all experienced, steady-footed men, accustomed to climbing and holding on firmly with their toes, as do mountain sheep.

The ruins are distinguished by a deep, dome-like cave at the west end, a perfect replica of the inside of an egg shell. Other notable features are the unusually perfect masonry in some of the walls of the crumbling houses, and the varied and high quality of the potsherds which were lying around. The pottery used by the prehistoric inhabitants of this place was of the three-colour type, thin and of a wonderful smoothness, most delightful to the touch. We also found a few arrowheads made of quartz and petrified wood, and some wooden tools, such as planting sticks, fire pokers, and several implements which might have been used in making pottery, or served to skin animals. We picked up four small pottery chips of different colours, that had been ground into disks; these we promptly decided must have been prehistoric man's poker chips because of their resemblance to those of to-day. Inscription House takes its name from some markings in Spanish, practically illegible, but the date of 1661 is readily discernible. The name of Inscription House never appealed to us, and because of the gambler's paraphernalia found I am tempted to advocate that it be renamed "Monaco"; or even "Canfield" might be appropriate.

In a deep recess of the cliff, not far from Inscription House, but on a level with the canyon bottom, we found extensive charcoal drawings, made by the present-day Navajo. Some were very clever in that they depicted with great accuracy the artist's conception of horses, bulls, cows in all sorts of postures, women, locomotives, and automobiles. These last, as drawn by Indians, are very striking.

On our return we all bathed in a mud-bottom pool near the camp, and declared ourselves immaculately clean. The plumbing in this bathtub was *not* out of order; it worked perfectly and to everyone's satisfaction, which is more than can be said of those in many "first-class" hotels, or even homes.

Before we retired we were visited, as was also the case at Shanto, by Navajos, who waited silently, without the least sign of interest, to receive the remnants of our supper. The meal was of necessity scant, as we had scarcely any wood. The few roots we could gather were barely sufficient to build a fire to heat water and to cook some rice and macaroni.

We slept well, though it was exceedingly damp. The dampness of this little oasis accounts for the rich and variegated flora. Notwithstanding my limited botanical knowledge, I was able to identify, within a space of two miles, lavender asters, candytuft, Brigham tea, mint, ox-eye daisies, white and lavender cleome, ragweed, white primroses, jimson-weed (*Datura stramonium*), four o'clocks, standing cypress, scarlet

buglers, flax, milkweed, wild tomatoes, wild geraniums, Scotch thistles, musk roses, and even dandelions and mushrooms.

At the junction of Neetsin and Navajo canyons, where a few Indian families have their hogans, an advanced method of irrigation coaxed cornfields from mother earth, as well as squash beds, and a few apricot and peach trees, all poor-looking, measured by Eastern standards, but in this obscure region they were promising and cheering to the sympathetic observer. Willows and cottonwood trees, which are usually found in the desert wherever there is surface or sub-surface moisture, were strangely absent near our camp.

Shadani, the splendid and reliable Navajo we brought with us from Kayenta, had never been so far. We brought him along chiefly to help us with the animals, and to track lost men or beasts, for which he had a most extraordinary instinct. Scouting parties would go out, either singly or in pairs, and if absent too long had to be found and brought in. It was not lack of confidence in Shadani, in ourselves, or in Wetherill's leadership, that made us decide, after leaving our camp at Neetsin, to find an additional Indian, one who would add his local knowledge to the desert craft already amply represented in our caravan. In one way this method of picking up additional guides as we went along was parallel to the practice of one Federman, whose record I read many years ago. He was made Governor

of the Spanish Main by his masters, the Fuggers of Augsburg, Germany, to whom Emperor Charles the Fifth had given what is now Venezuela, in consideration of the burning of the notes and other evidences of the latter's debts to them. Federman landed with his retinue intending to survey his employers' possessions. He found some natives who could understand the Spanish language, besides their own and those of adjoining regions. These were made part of the landing party *volens volens*. They proceeded inland and captured some more natives. Farther on they captured still more, keeping up this method until they reached the end of their explorations and survey. Their object in securing these natives was to have with them men who could make themselves understood in localities where different dialects were spoken, where information could be obtained by this relayed method of interpretation. For this reason we secured Not-si-san.

Not-si-san

In Not-si-san we found the right type of Indian. He at first came to our camp, near the junction of Neetsin and Navajo canyons, to beg for some coffee, sugar, and tobacco for which he was hungering. We induced him to enlist with our caravan, and in this way to receive these luxuries from us in the form of a wage of ten dollars, with which he could buy all he wanted. This hankering of palate and stomach enabled us to catch our quarry. We felt that the bargain we had made

was not only good business but sportsmanlike and true charity. Esau, because he was hungry, sold his birth-right for a mess of lentils; Not-si-san sold his knowledge for the equivalent of ten dollars worth of coffee, sugar, and tobacco. Esau had to have the lentils or starve; Notsi-san was not starving, but the luxuries purchasable with ten dollars were more valuable to him than the risk and time taken in guiding us.

In one of the branches of the Navajo Canyon, into which we descended after climbing out of the main canyon, we met an Indian who pointed out where we would find a cold spring beneath the muddy rivulet. To tell a man of a cold spring in these parts, especially in midsummer, is like telling him of heaven. Johnson went to work on the designated spot, built a circular mud-dike around it, and soon had the clear water bubbling up. All drank their fill, except myself, who made it a strict rule never to take any but boiled water, depending on the supply in my water bag to suffice between camps. I cannot stress too emphatically the need for this precaution, for I have seen men in great distress after drinking unboiled water in these regions.

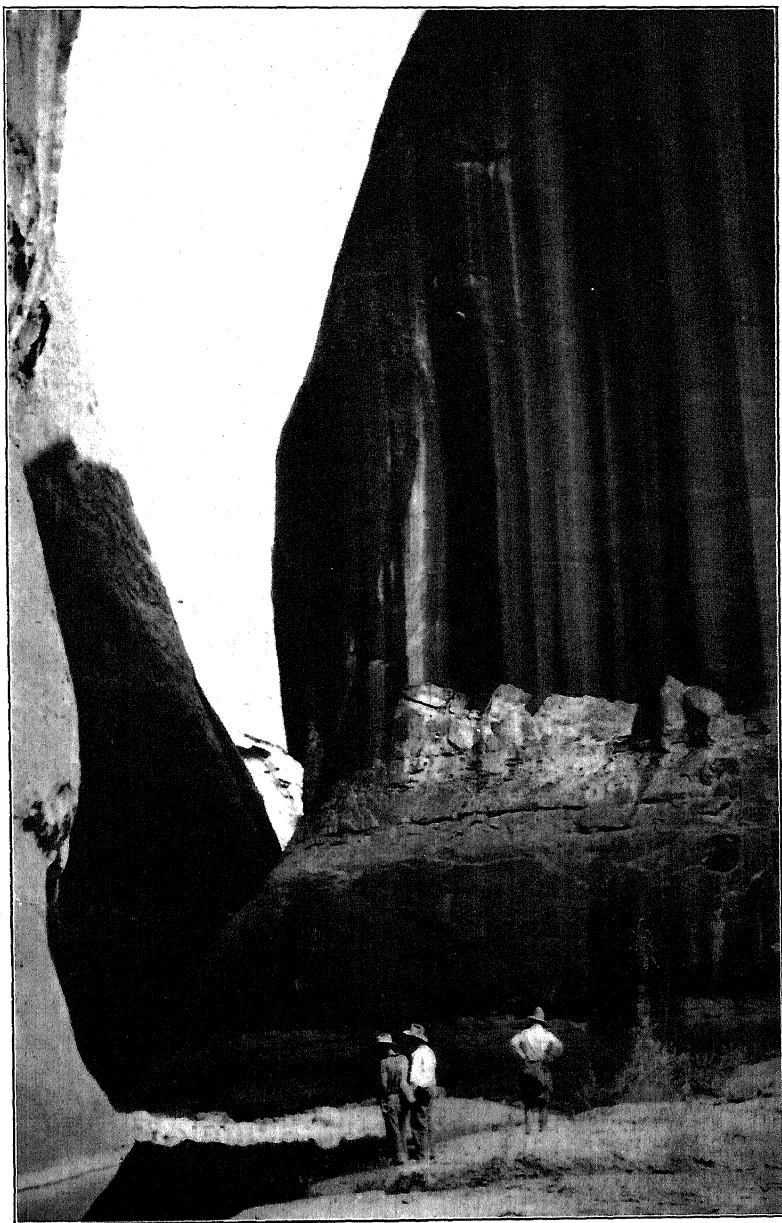
After we left Navajo Canyon and its tributaries we crossed innumerable slick-rock ridges, none of them bad, but tiring because of the heat. In all we travelled about eighteen miles that day, more than ten of them over a bleak plateau, by the crossing of which we avoided an elbow of Navajo Canyon, saving fifteen or

twenty miles of travel. The plateau offered an uninterrupted view of the country to the north. In the northeast, Navajo Mountain stood bold and blue above the desert; to the left of it was an unnamed mesa. West of Navajo Mountain and beyond this unnamed mesa there was an imposing, straight-walled rock mass known as Cummings Mesa, and to the west of that a ridge composed of several dike-like rocks, having no name, but which, because of their camel-like shape, I called "Crouching Camel." Far to the west was Tower Butte; its location, however, does not at all tally with the Gregory map, which is the best available. In the middle of the afternoon we once more reached the brink of Navajo Canyon, which then followed a westerly course. It was due entirely to Wetherill's desert-craft and native ability to ferret out ways and means of progress that we found a feasible way of reaching the bottom of this canyon, whose precipitous but slightly broken walls seemed impassable except on all fours. He found a moving sand dune which reached about halfway up the canyon wall. We managed to steer our packtrain down to it, and then followed its knife-like crest to the canyon bottom, with its beckoning pools and stray patches of greenery. I hate to think of the awkwardness of our situation had we failed to discover this practical way out before dark. We had been without water since morning, and on the plateau there was no likelihood of finding any.

Our camp that night proved very unattractive. It

was in the bottom of a V-shaped ravine branching off from the Jay-i Wash, which is a northern fork of Navajo Canyon, not far from where we came down by means of the sand dune. We named it "Do-ya-shon-da Camp," which means "Camp-No-good." There was not a particle of feed for the animals. Johnson cleaned out a spring in Jay-i Brook, the location of which was indicated to him by Not-si-san. It yielded good water. The surroundings of the shut-in camp were oppressive, but our irrepressible Johnson was constantly singing, telling Mormon stories, and applying his peppery and refreshing repartee. After supper Wetherill also added to the enjoyment by giving us the benefit of his unlimited knowledge of the country round about, and Morris started his standard questions about the basket- and pottery-making aborigines who once lived here, while I contributed from my own store of wisdom, based on the experiences gathered as a "cliff-dweller" in Manhattan. In this way the surroundings were soon forgotten.

One day I saw a rattlesnake track in the sand; it was of the type called "Sidewinder." This is the nearest I have ever come to seeing a rattler except in the Zcölogical Park in the Bronx. Possibly the precautions I have taken against the danger of being bitten may have had something to do with my immunity. For years I had carried with me on these journeys tourniquets, sterilized scalpels, ammonia, permanganate of potassium, and strychnine; but on that



Hiking through Bridge Canyon, on the way to the Colorado River.
Our attention was attracted by the catfish in the rock pool.



Making the descent from Keetseel Cliff Ruins. In reality less perilous than the picture indicates.

journey, and on later ones, I added three vials of rattlesnake serum lent to me by my friend, Mr. Richmond Talbot, who had imported it from São Paulo, Brazil, where alone it is prepared. He also furnished me with most minute directions for its application. A sterilized hypodermic syringe with several gold points completed my precautionary measures. Prof. Raymond L. Ditmars of the New York Zoölogical Park had occasion to prove the complete efficacy of the serum when he applied it to one of the keepers in the snake house who had been bitten. Though he had completely collapsed, the serum saved him.

Rattlers suggest two other pests to be met with in the rocks: scorpions and centipedes. These, while not numerous, must be guarded against. One should never lean against rocks or boulders unless one is sure that they do not harbour these insects.

Professor Guernsey, whom we met in Sagi Canyon in 1922 on our way back to civilization, seemed uncomfortable riding his horse. I asked the reason and he got off and showed me a round black patch, four inches in diameter, on his leg. He had a suspicion that it was the bite of a scorpion which he had neglected to treat. A copious application of a 15 per cent. solution of ammonia, which I had, relieved him, but a year later he wrote me that the poison of the bite had permeated his system and had given him trouble for six months. I believe an immediate application of ammonia, or even slashing of the tissues immediately surrounding

the bite, is the best "first-help" when only a limited medical supply is available.

Jay-i to Colorado River via Sirocco Pass

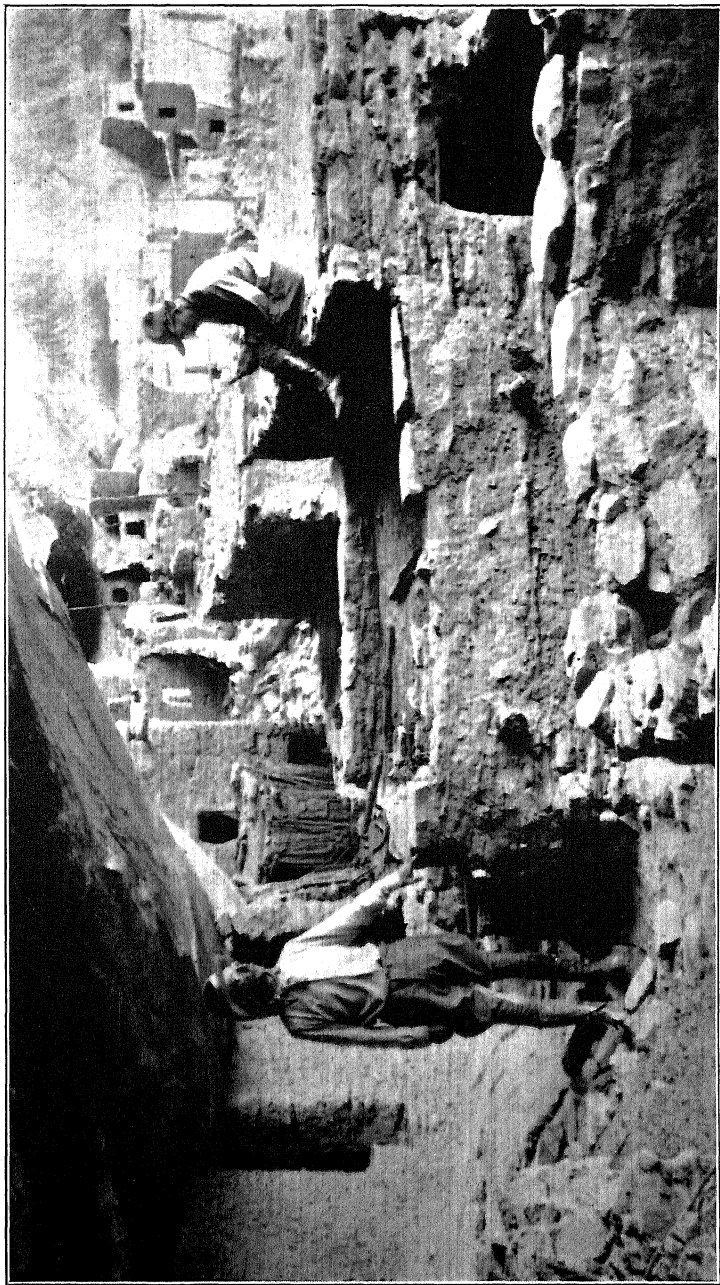
After an uncomfortable night at Camp No-Good at Jay-i we started on our journey at nine A. M. We had six loaded pack animals and three more in reserve. There were five men, including Not-si-san, who now rode in the lead. Wetherill had been as far as Jay-i, but, so far as is known, no white man has ever before set foot on the stretches separating us from the Colorado River and the San Juan River west, northwest, and northward. We cached most of our food and all of the baggage that could be spared in order to have the lightest possible pack outfit. We planned an absence from Jay-i of from three to four days. Meanwhile, Shadani, with some of the pack animals, was to try to obtain more corn from Indians in Piute Canyon, for we were desperately in need of additional feed for our horses and mules. The wayside forage was extremely poor. We certainly tempted fate when we rapped at the closed gate of the Unknown after leaving our camp at Jay-i Creek on July 2, 1921, against the warning of Not-si-san that no white man's horse could do what we now contemplated, and that what we had done before was like child's play. We were incredulous, believing his statements were prompted by braggadocio or were an instance of the well-known trick of primitive man to delay us, perhaps deter us, thus

earning his wage without much labour. It might even be an endeavour to prevent the white man from opening up what the native regarded as his own special preserve.

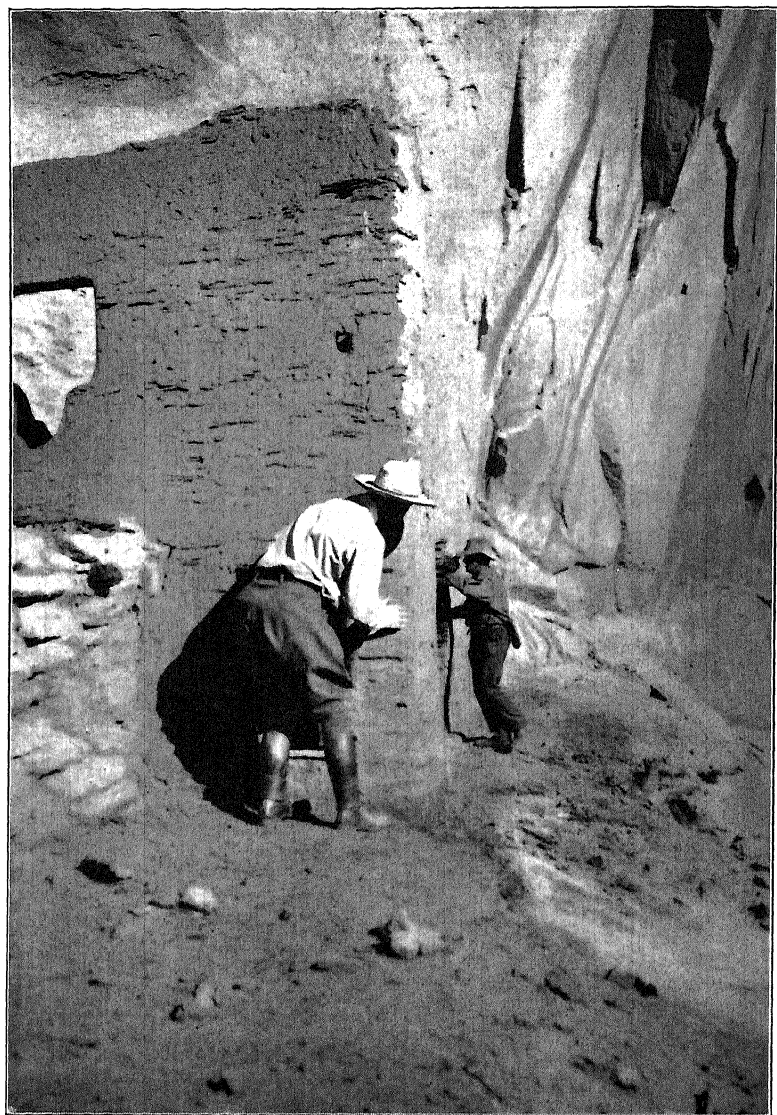
The dike-like rock chain in the north, which I had named "Crouching Camel," was the landmark by which we steered our course. On the way up, constantly up from one ribbon-like shelf to the next above it, we passed a symmetrical mesa, lying southwest of Navajo Mountain, which because of its shape we named "Octagon Mesa." The trail led up to the very base of "Crouching Camel," the south side of which we skirted for about a mile. The view was appalling. On every side yawning, rocky throats, bare of vegetation and probably 600 feet deep, opened up before us. Beyond these funnel-like gorges were humps, tubercles, and whalebacks, a veritable sea of them, gray and bare; beyond them a narrow vein-like crawling green thread was discernible. That was Navajo Canyon. Far in the distance, southeast by east, White Mesa and Square Butte could be seen, sharply defined against the skyline. Halfway between these landmarks and ourselves was a series of connected high mesas, towering over a vast expanse of gray, cream, and greenish dome-like baldheads, which because of their resemblance to snails we called "Garden Snail Mesa." Between the head and the hump we climbed on foot over rolling sand and stone from the south to the north side of "Crouching Camel." The gap was a regular wind

funnel; the blast carried small pebbles that stung like hailstones. We had gone but a little farther when Not-si-san stopped, wearing an "I told you so" expression. He waved his hands downward. There was no turning back, and ahead of us was a steep descent over slick-rocks, with occasional sharp bends and narrow ledges, one quarter of a mile or more in length. Fortunately the wind had chiselled delicate wavelets into the rock surface. This somewhat improved the footing, but the descent was steep and staggering, with nothing to hold to in order to prevent slipping. There was no time for faint-heartedness. No one dared to be dizzy. A scare among the pack animals meant disaster. To stop to think was impossible. "Move and take your chance" was the unspoken command. Not-si-san had made way for Wetherill to guide, and the latter's genius and generalship extricated us. We got down without mishap, on foot, of course, crawling on all fours over seemingly endless expanses of slanting rock. The animals took care of themselves; sliding, pawing, and sitting, they advanced sideways and frontways. My respect for these fearless, resourceful, sure-footed, and tireless friends has no bounds. They were always at their best in the most hazardous places, and at their worst when the going was easy. A slipped load and a stubborn mule enlivened the descent, fortunately after the worst was left behind.

We came to a water-hole about noon and the horses and mules, in their eagerness to drink all at the same



Keetseel Cliff Ruins. Here man lived in comfort and comparative security one thousand or more years ago. The roof of the settlement is formed by a cave-like overhanging rock, 200 feet deep.



A sheer drop of over 100 feet on one side, an old house wall on the other, with rolling stone under foot, created this hesitation in the cliff ruins called "Inscription House." John Wetherill took the lead; the author refused to follow. Note the T-shaped door of the house.

time, made anything but an edifying picture. The water was old, stale, and slimy, and smelled like ammonia, but it was wet and served to lubricate their parched throats. Our Indian, Not-si-san, was certainly a valuable acquisition, for he led us off a short distance to a series of three pot-like depressions among the slick-rocks, in which there was good, clear water. The pot holes found here and elsewhere in the desert constantly bring to my memory the Glacier Mills in the Gletcher Gardens in Lucerne, undoubtedly produced by the same natural process. We made ready for a well-deserved luncheon of canned vegetable soup with a kick in it: that is, it was enriched with Steero cubes. Sardines, Australian jam, coffee for the others, and hot water for me, rounded up this substantial meal.

We called the spot "Our Camel's Camp" but we could not tarry there for a much-needed siesta. The unknown loomed ahead. The day was still young, but before nightfall we had to find a suitable camping ground, with feed and water. No one knew the obstacles to be overcome. The morale of our little party was fine; the pioneer spirit dominated and in our minds physical obstacles shrunk. Unfortunately a furious windstorm had started in. The wind devils were gyrating around us. We had a suspicion of what was ahead. An hour's hard riding over typical "bad lands" brought us down into a dry and wide river bed, in a rock defile which soon became a broad valley, filled by a stream of loose, deep sand. At one time this

must have been a mighty river, possibly a quarter of a mile or more in width. We were travelling northwest. The wind was blowing from the west. Even now I can vividly recall the burning and stinging sensation on my left cheek which received the full brunt of the storm, a blast that never seemed to let up, as do the winds in the East, where they will blow furiously, then stop, gather force, and blow again. Here on the sand river they never paused. For nine miles we rode on. Our horses, often wheeled completely around by the wind, seemed to understand the meaning of the determined will on top of them, which directed this mad pace through deep and tiring sand. We felt that this big, dry watercourse could have but one termination and that was the Colorado River, our objective. It seemed too important a tributary to be willing to consort with lesser ilk.

Our theorizing proved correct finally, but something unexpected was still in store for us. I do not call it a surprise, for in a country so full of surprises it seemed the normal. A vast barrier of dome-shaped rocks appeared ahead of us and seemed to block the way to the Colorado, which even then we were merely guessing was in the deep gorge facing us, a mile or more distant, and which, by reason of the contour of its walls, recalled the well-known Colorado Canyon. We climbed these slippery, hard-shelled rocks and at last saw the glitter of that majestic stream, the drainage channel of so many of our important states, the greatest hy-

draulic excavator on the American continent, a storehouse for the future economic and mechanical power on this continent, the Colorado River. Our sand river, which had changed its course to a northerly direction by reason of the barrier of rocks interposed near its normal mouth, had burrowed through a narrow channel, not over thirty feet wide, to create its present outlet. What a degradation for such a mighty stream!

When we threw our saddles and packs from our tired, tortured animals that evening near the shore of the Colorado, we voted ourselves "regular fellers!" Certainly within the range of one day's travel we had had a most substantial cycle of desert experiences. We were a well, happy, and harmonious lot of youths of all ages, who thought of the result, forgot the hardships and fatigue of the past, the aching, sun-blistered faces of the present, and looked hopefully and determinedly into the future. We had been in the saddle nine hours and estimated that we had ridden from twenty-five to twenty-eight miles. Mindful of the wind and sand storm of the afternoon we decided that Sirocco Pass would be an appropriate name for that stretch between "Crouching Camel" and the Colorado River. Wetherill estimated that our camp was located approximately thirty-five miles above Lee's Ferry and twenty-five miles below the mouth of the San Juan River. The evening sun was burning furiously and the heat was overpowering because of the dampness of the ground. It has been our experience in this dry country that

whenever there is any ground dampness the heat is almost unbearable.

Colorado River Camp

After a night of sound sleep we employed the morning of July 3rd endeavouring to find the much-mooted location of the Crossing of the Fathers, namely, that of the Spanish priest, Escalante, and his brave followers, who in 1772 crossed the Colorado River somewhere near here.

A mile north of our camp the Colorado swings abruptly toward the east. Between the river and the south cliff there is an ancient sand bar six to eight hundred yards long and of varying width, thickly overgrown with willows and rabbit bushes. An old trail leads down to the western end of the level stretch. The river is comparatively shallow here, pouring over a riffle which extends diagonally across to the northern shore, and ends beneath a point in the cliff which seems sufficiently sloping to make an ascent with animals possible. We came to the conclusion that this must be the Crossing of the Fathers.

During the morning we made a curious discovery. We noticed deer tracks. Suddenly a big blacktail doe ran by. Wetherill tracked her through the willows which lined the Colorado's shore; he wanted to photograph her, but of course did not succeed. All at once the doe came back and passed us not fifty feet from where Morris and I were standing. Johnson came

upon two baby deer which at sight of him scurried into the thicket and could not be found again. What made this experience unique is the fact that there are no deer along the south side of the Colorado. This poor creature must, therefore, have swum from the north side of the river, where deer are plentiful, and found herself unable to return. Here, in a veritable Adamless Eden, with plenty of water and food and shelter, and in complete security from wild beasts, her fawns were born. On the cliff face, which formed the southern boundary of her domain, there were four hundred feet or more of pictographs and traces of ancient cliff houses; but these had been covered by a fall of rock.

The walk to and from the supposed Crossing of the Fathers was most fatiguing. We did not return to camp until one-thirty in the afternoon, too late to continue our journey. During the afternoon everyone but Wetherill and Morris did camp loafing. It was hot, so Not-si-san and Al constructed a hut in Navajo style to shelter us from the merciless sun. It was fashioned out of willows, which grow in profusion along the Colorado. Wetherill and Morris reasoned that if we had found the Crossing of the Fathers that morning, then the cliff house at the southern end of it would have been the logical place for an outpost to greet the approach of an enemy from the other side of the river, as well as for a depot for caching baggage not required on expeditions into the country beyond the watercourse. Hence they went back with shovel and pick, a

walk of an hour and a half each way, to do some excavating.

At five o'clock Johnson, Al Smith, and I had our second bath. This is not bad luck for travellers in the so-called waterless wastes. We cautiously examined the shore of the swift and then swollen, angry-looking Colorado River. It was only then returning to its normal bed, and at this particular spot, judging by the markings on the willows and the dried mud near our camp, it probably rose to a height of six feet above where it was that day. I am tempted to say it was eight or ten feet higher. As there were eddies and back currents near the shore, as well as evidence of an undertow, we confined ourselves to quick ablutions. Even then, standing on the river ooze two feet from shore, the suction of the mud was so strong that one could not remain in the same spot more than half a minute at a time. Of course the water is colorado-coloured, hence the name of the river. The effect of the bath in the cool—rather cold—water was all one could wish, and even more than one could reasonably expect on a trip such as ours.

The rock and scenic effects in this spot are typical of the Grand Canyon. The only flowering things around us were the willows, mountain mahogany, and the wild tomato. I believe the latter has been misnamed; to me it looks more like a wild hollyhock, judging by the leaves and the arrangement of the blossoms, which are of a burnt-orange colour, and are

abundant everywhere in the desert. The willows have white and orchid-coloured blossoms and they seemed to be in good condition, notwithstanding the sousing they had received only such a short time before our visit, when the Colorado overflowed. It should be remembered that the flood at Pueblo, Colorado, which did so much damage in that particular section, had occurred only a few weeks earlier.

We spent two nights at the Colorado River camp and left the morning of July 4th, at seven-thirty, to cut across country toward Navajo Canyon, with Notsi-san leading and, at times, misleading us. My only unhappy experience with water, though it was boiled, occurred here. We were compelled to use the water from the Colorado River. There was no other within reach, and its effect on me was most distressing. I felt a reluctance to drink at all, notwithstanding the excessive heat. This condition lasted during all the time we were at our Colorado camp, and until we found some old rain water which had collected in a rock depression.

We travelled in a southerly direction over sand flats, down washes into loose sand, knee deep, along the westerly face of rock masses which we called Clara's Mesa, a compliment to Mrs. Bernheimer. This series of massive mesas and buttes stretched along the south side of Sirocco Pass. The chain of mesas bounding the north side of the Pass we named Helen and Alice Mesas, after my two daughters. In one of the alcoves of Clara's Mesa we observed a huge detached rock, a

perfect replica of a German helmet, similar to the small one called the Kaiser's Helmet, to be seen in Moencopi Wash. We named it the Prussian Helmet.

At about half-past one we reached a spot which had once been a spring, but was now dried up. What little vegetation remained was in a sorry state. We relieved the patient animals of their loads and then squatted down in the shade of a ledge to a lunch of canned tomatoes, canned pears, sardines, and the remnants of Johnson's famous breakfast biscuits. We did not dare to drink too freely of the contents of our water bags because we had not the slightest idea how far or how difficult would be our way to the lower reaches of Navajo Canyon, our next objective. Not-si-san's word did not inspire complete confidence.

Navajo Canyon

After luncheon, at the end of an hour's ride, most of which was over slick-rocks which meant plenty of walking and leading our horses, we found ourselves, much to our surprise, on the brink of Navajo Canyon. The descent was easy. Johnson and Al rode upstream to find a suitable camp site, while Wetherill, Morris, and I rode off downstream, crossing the creek twenty or thirty times. The sun burned severely, but it was a relief to have flowing water by one's side all the way. We fell in with an Indian and learned that there was a cliff house about halfway to the Colorado River, and that it would take us until dark, about eight o'clock,

to reach it. Consequently we turned back toward camp, deciding to wait until morning to explore this ruin and the lower canyon.

Johnson and Al had chosen for the night camp a spot beneath an over-hanging cliff on Kaibito Creek at the junction of Navajo Canyon, which is muddy and turbid. The former has good clear water bubbling over gravel. Because of a kingbird's nest in a niche above us I called it Kingbird Camp. The mother bird, unaccustomed to so many visitors and so much noise, fluttered around us and did not dare to enter the nest until dark. In the nest was a young bird, peeping incessantly in answer to its parent's call.

✓ On the morning of July 5th Johnson and Al Smith set out upstream to our old camp at Jay-i which, we reckoned, was two days distant. Not-si-san had left us. Wetherill, Morris, and I, with the local Indian, went in search of the ruin which the latter had said was halfway between our camp and the Colorado River. His statement was correct, at least so far as the ruin was concerned. For almost three hours we rode in and along the creek before we reached the place he had in mind. This meant about ten miles of travel; consequently it would make the Colorado twenty miles distant from our night camp. There is little doubt that the rest of the canyon, that is, the part we did not visit, is of the same character as the part we traversed. We assumed that there were no rapids or falls because we frequently saw minnows from an inch to an inch and

a half long in the stream. White man had never been so far and, moreover, rumour had it that Navajo Canyon was impassable.

We found two ruins, both disappointing. The larger one was inaccessible unless one could put in two or three days' work cutting steps into the rock, or making ladders to get up to it. It was about one hundred feet long, situated in a shallow recess. From the appearance of the ruined walls we had the impression that it might not have been a dwelling place, but rather a shelter against attack. We, therefore, called it Barri-cade Ruin.

Our Indian, who with his family were the only inhabitants of the canyon between our Kingbird Camp and the Colorado River, said there was no other ruin there except the small one that we visited about half a mile upstream. This we called Scorpion Ruin because I killed there one of those graceful insects. The little cave is symmetrical and contains but one room. We found a few pottery fragments after digging down to bed-rock in the fireplace and the burial cist near by. We also found corn cobs, pumpkin seeds, charred wood, and a reed cigarette. Morris marked on the wall of the cave: "Bernheimer Expedition, 1921."

As horse feed was extremely scarce in this canyon, and our own food supply none too plentiful, we turned back upstream, and at a quarter after two halted for a lunch that would make my home friends' hair stand on end. It consisted of two cups of coffee, many cups of

hot water, cold Cream of Wheat saved from the morning's breakfast, and a can of preserved pears. We had enough and it tasted fine. The real nuisance was that, on the shady side of the cottonwood tree which sheltered us, red ants were pestiferously numerous. Their sting, however, only annoys; it leaves no swelling.

Here I must make an important correction. Information gathered from the two Indians, Not-si-san and the one we met out here, shattered our belief that we had found the Crossing of the Fathers. We now know, however, where it really is, although we had neither the time nor the food to visit it ourselves. The true crossing is located about five miles down the river from where we camped. There, we were told, a reef in the Colorado River makes it shallow and fordable—the only place fit for a horse to cross.

While returning up Navajo Canyon we visited the home of our temporary guide, Dogi-stlani-bega, which, translated into English, means the Son of the Bearded One. His hogan was located on one of the earth shelves left in the canyon by flood drift. Living with this middle-aged Indian were his old father and his young wife, whom, Wetherill says, he may have bought with the consent of her mother for the then "market" price, which was about ten horses. They had four children, two girls and two boys. In the canyon we picked up some toy pottery made by the children. Morris photographed the vessels *in situ* and took them along with him for the American Museum.

Speaking of family life recalls the age-old reference to the mother-in-law. The white man, through jokes levelled at her, has forced the mother-in-law into submission, so that she need no longer be considered a disturbing element in his peaceful pursuit of happiness; but the red man has used more radical means. He has relegated her to the place he considered proper by proclaiming, through his leaders and medicine men, that, if she would preserve the eyesight of her daughter's husband, she must never visit the new home except in the absence of the son-in-law. Customs have their underlying reasons. I wonder what calamity in the dim past dictated such stringent measure.

Another custom among the Navajo Indians may be worth recording. In our travels we passed many deserted hogans, and this, naturally, raised the question as to why the Navajos left these apparently sound homes, which had been constructed with such infinite care and effort. Wetherill explained that when a Navajo dies his body is usually removed through a hole cut into the hogan opposite the entrance and the dwelling thereafter is deserted. The custom probably has a sanitary background. The Indian, dreading the spirit of the illness which has carried away his loved one, fears that this spirit may hover around and possess itself of the surviving members of the home.

Our camp of July 5th to 6th in Navajo Canyon, two miles above its junction with Kaibito Creek, was cheerless and desolate. We called it Hardboiled Camp.

because there was absolutely nothing for our horses to eat. There we photographed a jimson-weed. This five-lobed lily, eight to ten inches long, is a most remarkable plant. It grows where even sagebrush hesitates. In fact, I have seen it thrive where nothing else was in sight, a gobelin-blue patch in a landscape of red sand dunes. Its leaves have a distinctly blue-green tone, and I have rarely seen them attacked by insects. I have been told that it is poisonous. The horses and mules, even when starving, let it alone. I brought some of the seeds back East and planted them in sandy soil on the grounds of my New Jersey home. I met with perfect success. It bloomed as freely as it does in the desert and required no replanting the following season.

In our journey up Navajo Canyon from Hardboiled Camp to Jay-i we were on the lookout for cliff ruins. We saw only three, the first about three miles from camp. Wetherill called it "Delmonico" because it was beyond poor man's reach. It was about one hundred feet up on the left side, and it would have required several days of step-cutting to gain an entrance. The shelf on which it stands is between seventy-five and one hundred feet long and not very deep. There are four well-built houses in apparently perfect condition, one double house in the centre, and a single one at each end of the shelf. We could not take satisfactory photographs because the light was not suitable, but Morris made a sketch of it. About three quarters of a mile

farther on we passed another ruin, small and insignificant, and two miles beyond this we found a shelf on which were some modern Indian drawings, two disks in white chalk that looked like targets, and some horses.

The entire trip up the canyon to Jay-i was hot and trying, and there was nothing whatever for the animals to browse on. I pitied the poor beasts as we had to cross the stream times without number. Once I counted three crossings within one hundred feet; moreover, Navajo Creek is full of quicksand pockets. My horse sank deep in one of them and required a sharp cut with the whip to pull himself out.

We reached the rendezvous at Jay-i at three-thirty in the afternoon, having stopped for a typical "starvation" lunch beside a little spring where there was some feed for the animals. My lunch consisted of canned pears, a few soda crackers, and some brackish water, with the local alkali flavour; nevertheless it was satisfying. Wetherill and Morris had a box of sardines, a delicacy I had to forego. To give an idea of what one can do out here on meagre rations I shall outline our supper at Hardboiled Camp. A mess of red beans into which some cheese was melted, three soda crackers, a can of Australian cherries, and five or six cups of hot water. The breakfast next morning consisted of two large portions of Cream of Wheat with the remains of the cherry sauce from the night before. The condensed milk had given out, so our cereal was served plain. A cup of coffee and several cups of hot water

completed the repast. Of course on rejoining the rest of the party, representing the Commissariat Department, we once more had bacon, jam, and condensed milk.

Shadani had returned from his foraging expedition but had gathered only one bag of corn. How this shortage would affect our proposed itinerary hinged on the amount of foraging the animals could do by the wayside. Now I understand, as never before, what it means to get out into wild, unknown regions, to depend on what one can carry along and what one can wrench from Mother Earth in her sternest mood.

Navajo Home Life

We heard that about a mile and a half down the canyon there was to be a chant. An Indian woman in the camp at the junction of Navajo and Jay-i creeks was ailing and the medicine man pronounced her under the spell of an enemy or an ill-disposed spirit. To ward off the dire influence, songs, libations, and sacrifices were to be indulged in. We set off at once. Inside a summer hogan of fresh green boughs we found eight or ten men seated around a fire. They talked, but did not smoke, as they had no tobacco, until I handed them two boxes of "Between the Acts Little Cigars."

In front of the hogan was another fresh bough shelter, beneath which was an old woman holding close to her a naked baby possibly eight months old. A middle-

aged woman, barefooted, with typical flowing Spanish skirt and velvet waist, wearing around her neck about a dozen strings of coral and silver beads, knelt beside an open fire. She was slicing fresh mutton for cooking. A thin but statuesque little chap brought up a big water jar, reënforced by willow netting, probably the same kind of vessel that his ancestors used a thousand years ago. The middle-aged woman scalded the iron kettle in which the mutton was to be put on the fire. A younger woman, adorned with turquoise and silver chains and bracelets, was grinding corn vigorously between a stone metate and mano. She was probably the mother of the baby and the two or three other children who were hidden in the fast-darkening shadows. She knelt in front of the metate, which was placed on the reverse side of a sheep-skin.

Here was the method inherited from the prehistoric aborigines. The Navajo probably found the metate and the mano in the cliff-dwellers' ruins and to-day puts them to their original uses. The cornmeal, freshly prepared, was to be baked into bread cakes for the repast following the chant. As we knew the ceremony would last all night, and as we did not care to eat their food, or to give offense by refusing to share it, we started back on our walk of a mile and a half up the wash, which the evaporation from the little Jay-i Creek had now made damp and cool.

Speaking of Jay-i Creek I must not fail to mention that we had our third bath there that evening. John-

son made a reservoir by building a dike across the lower end of a swampy place in the bed of the wash behind which a few pailfuls of water had collected. When lying down the water covered only one third of our bodies; but it was a bath. The next thing I did was to wash my towel. It was, of course, muddy, even after it was soaped and rinsed, but the dirt was clean. After being spread out on a bush for a few minutes the towel was dry and the sand could then be shaken out. Before bathing we had a general sewing festival. Shadani patched his trousers, Al Smith did the same, while Morris mended a rent in his tarpaulin.

Jay-i to Clematis Camp

Although we rose at five-fifteen on the morning of the 7th, we did not get under way until eight o'clock. We climbed a sandy old creek bed for an hour until we came to what looked like a plateau. (Suddenly, slightly to our right, a great hole opened, hundreds of feet deep. Wetherill called this West Canyon Kettle; at the bottom it was quite black. It had the characteristics of a crater but might have been a blowout of natural gas, an indication of the presence of oil. Although we wanted to reach West Canyon, which was north of us, we had to strike off to the left, or westward, for it was impossible to climb down the side of the "Kettle." About ten years ago Wetherill had gone over this same ground. His memory of the faint and intermittent Indian trails is most remarkable. We strayed but

rarely. He is beyond all doubt the typical pathfinder or pathmaker. (The trail here was anything but easy going. It was very rough and at times almost impossible. We finally descended into Ferguson Canyon, a tributary of West Canyon, and followed it to a point where there were water and abundant grass for the animals. Here we halted for lunch. Our object was to travel down Ferguson Canyon to its junction with West Canyon, to descend the latter until it met with Bridge Canyon, then to go up Bridge Canyon to the Rainbow Bridge.

Half a mile above this camp in Ferguson Canyon there was an isolated rock, on top of which were some man-made walls. Morris climbed up and reported that the structure was of a purely defensive character. It bore no signs of a permanent dwelling, and there were no pottery chips to be found. We dubbed this place Rock Island Ruin. With the exception of Wetherill, Morris, myself, and a man by the name of Ferguson, who had carved his name on a rock, I believe no white men have been in this vicinity.) At six o'clock that evening we found we had lost our way. This was due to the fact that there were no trails hereabouts to be depended on. Such as there were proved misleading. They were merely old tracks made by sheep and goats that come into this region to graze when there is extreme drought elsewhere; and at best goat trails are notoriously undependable and far from serviceable for a packtrain. For an hour there was scouting in all

directions. In the meantime, Morris found a cliff-dwelling site in a cave near by and in it pottery chips, a stone knife, and a large number of rubbing stones, both metates and manos.

Stumped

Wetherill finally decided that there was no use in attempting to go farther. We retraced our steps for some distance and then literally tumbled down into the bed of West Canyon, at a point east of Cummings Mesa, and about halfway ^{1/2} of its long and powerful bulk. The brook had dried up, or lost itself in the sand, but there was water in the rock pools and good feed for the animals. Near by were cottonwood trees, live oaks, scrub oaks, sweet-william, milkweed, and, to our surprise, white clematis in profusion. We named our halting place Clematis Camp.)

July 7th was most trying. Rough does not begin to describe it, and my admiration for our horses, fearless and sure-footed, without which this land would remain sealed, is greater than ever. Of course, they are animals and give plenty of trouble. They need the whip and spur, and strong language, the kind they have most often heard and have learned to understand. We had eighteen in all, seventeen of which belonged to Wetherill and Johnson, while one, a true Navajo Hammerhead, was the property of Shadani. My own friend is called Old Reliable. His step is somewhat short compared with that of the other horses, consequently he often resorts

to a jog-trot to catch up. While this is annoying and wearying, I would not exchange him now that I know his many good qualities.

Early on the morning of July 8th, Wetherill left Clematis Camp on foot to go scouting. West Canyon is difficult travelling; one cannot remain long in the canyon bottom because of shelves of hard limestone. In pouring over these the flood waters had scooped out great pools beneath them, which even now were filled with water. The shelves were so high that the animals could not go down them, and even if they had been able to do so we could not have afforded to have our food supply and baggage saturated. This necessitated climbing to the higher benches parallel with the canyon, and frequent retracing of our steps alongside of perpendicular cliffs. Owing to such delaying conditions we were far from certain that we had enough supplies to permit us to pick a way down to the junction of West and Bridge canyons. The question was whether or not to attempt it afoot, leaving our animals behind, a feat requiring great exertion, on account of the long sand stretches, ankle deep, and the constant climbing up and down; not to mention the possibilities of quicksand in West Canyon bottom and the need of carrying our food. It was furthermore impossible to calculate the approximate time such a trip would require, as distance and difficulties were unknown factors.

While waiting about Clematis Camp I picked up some seeds of wild flax, Indian paint-brush, and the mahogany

bush. The latter is called also bitter bush, quinine bush, buckberry bush, and deer bush. The odour of its white and gold blossoms resembles very strong vanilla, and its leaves are coral-shaped and a deep green.

At twelve-forty-five Wetherill had not returned. While this enforced rest was welcome in one way, it was most irksome in another, for it meant that Wetherill's plans were not working out in this troublesome canyon and that, in consequence, our entire scheme and objective might have to be changed. Wetherill, being a strong individualist, had not said why he went on foot, when he would be back, whether he would travel on the right or left of the canyon, or whether he would look east or west for a way out. Had any mishap befallen him, we would have had great difficulty in finding him. Of course, we had our Indian whom we could send out to track him; but at best that is a slow and tedious process. In the meantime, a valuable morning and fifteen miles of travel, which we could otherwise have made, were wasted, as well as the food allotment. Waiting such as this is anything but pleasant; however, coming out here we do not expect all things to run according to definite schedule; but we fully succeed in shaking off the harness of business routine. The worries of outdoor life in the wild are a wholesome counter-irritant for the tension of city life.

(At one o'clock Wetherill turned up safe but worn out. He reported that it would be necessary to abandon our original plan to go on down West Canyon,

that we would have to turn eastward in order to get out of this next-to-impassable country. He said there would be no difficulty in climbing up from West Canyon but that it was almost impossible to get down with our animals into the next canyon to the eastward. He decided, however, to risk the latter.

We worked our way with comparative ease to a tiny plateau, and there waited for an hour while the search went on in every direction for a means of descending the wicked-looking slick-rocks in front of us. It was entirely due to Johnson's scouting that we were finally able to move on. He returned with the information that the trail was not so bad. He had found a route, but there was no reason to suppose that saddle animals had ever been over one like it. He led us. We followed, and if Johnson's "not so bad" signified anything at all, I should say his "bad" must be impossible. That we and our animals got down at all, and with nearly whole skins, is a miracle. The last lap of the trip was a sheer drop of six feet over a perpendicular ledge, down which the horses plunged into knee-high grass on the canyon floor. Many a bleeding ankle and scraped side resulted, but that was to be expected.

Goldenrod Canyon

In this canyon a lightning change occurred. There was plenty of grass, twenty inches high; there were acres of poison oak and goldenrod. We called this Goldenrod Canyon rather than Poison Oak Canyon,

as the latter would have been ungrateful. Our horses browsed here as they had not found an opportunity to do for many a day. There was no surface water, but we found a rainwater pocket deep in a rock from which, by lowering buckets tied to a rope, we secured all that was needed. Cottonwood trees of all sizes, willows, rose bushes, and every conceivable flower to be found anywhere out here were in evidence. It was a veritable paradise and a grateful contrast to our day's experience of waiting, worrying, and rough riding.

We spread our luggage by the water pocket and voted this camp of July 8th to 9th the best thus far on the trip. Before settling for the night Morris and I looked for cliff ruins, and in the course of a mile discovered five of them, all promising fields for investigation. There was much broken pottery, of a very fine quality, scattered about. We ran across many arrowheads and knives of petrified wood. In addition there were large numbers of rubbing stones (metates and manos). Pictographs and paintings on the cliffs were entirely absent.

We had covered only four or five miles in the day's work of July 8th.

At eight o'clock on the morning of the 9th, we started to get out of Goldenrod Canyon, not a difficult performance at first, but at the top we met with obstacles in the form of ugly slick-rock, the worst of which we had to cross sidewise with a drop of a hundred feet or more to the left of us. In case of a mishap there would

have been no anchorage between us and eternity. The stretch was short but perilous. Often the only break to slipping was a microscopic particle of quartz, a mere speck of sand strongly imbedded in its matrix. This would hold the foot, or the iron of a horse's shoe, and because of its grittiness prevent the slip which might have been fatal. At other times the judgment of a hard-worked, humble horse saved the hour. But danger is present everywhere as is also God's guiding hand. Where trust and caution prevail, fear should be banished; it can serve no good purpose. It was a question of going that way or retracing our steps. Onward we went as the lesser of two evils. We were now within close range of Navajo Mountain, also the notch between it and the nameless, detached mesa to the northwest of it, which we would have to cross if we were to attempt to reach Rainbow Bridge by going west of the mountain. The wish to do this had, however, to be abandoned, as well as the attempt to get to the Colorado River by way of West Canyon and thence working our way up from West Canyon through Bridge Canyon to the Rainbow Bridge.

Change of Objective

Two things determined our decision—lack of time and shortage of supplies. Unlimited time, sufficient food supplies, a proper blasting outfit, might make the trip through the West Canyon possible. It would take fully two weeks, however, because of the many creek shelves which have to be skirted or blasted.

Wetherill advised against travelling from where we were encamped through the gap between Navajo and the nameless mesa, because he believed that the horses could not pass that way. It would be necessary to go on foot, sending both saddle and pack stock eastward around the mountain, over the known trail to the Bridge. It is difficult to estimate the obstacles that must be overcome on an original exploration—by which I mean a journey never before tried by white men under white-man conditions.

After passing the last of the slick-rocks at the head of Goldenrod Canyon we sighted a large cliff ruin in a cave, but it was too distant, or rather too awkwardly situated, to be visited at that time. We also passed many prehistoric Indian garden patches in terrace form, and two detached ruins on the south slope of Navajo Mountain. Endische Spring refreshed us with real mountain water. A short distance beyond a large Pueblo ruin, called Red House, covering probably an acre on the flat, made an interesting background for our luncheon camp. Pottery fragments, stone chips, manos, and very neatly and perfectly built walls, gave us much food for discussion and speculation.

Beaver Creek

Following a brief halt we started onward and at seven P. M. had partially encircled the mountain and reached Beaver Creek, for which the Navajo name is "Cha.") The animals had a hard day of it as there

was nothing along the wayside included in their ordinary menu. All the poor things could do was to nibble occasionally at a sagebrush, scrub oak, or possibly a live oak; but the poor fellows, while showing fatigue, jaunted on. They drew on their reserve force in plenty, and moved along with little more urging than was usually necessary. To one who has not witnessed what their muscle and endurance can accomplish the following will seem almost incredible.

We were in the saddle at eight o'clock that morning. At eleven we reached Endische Spring, resting there half an hour. At twelve-fifteen we had our lunch while our poor horses, tethered to trees, looked on, each one receiving only about a pint of corn. At one-fifteen we were again in the saddle and rode until seven P. M. We went ahead steadily, walking, jogging, or trotting, in order to reach the place where there might be a little water in the holes and pockets of the creek bed, but where last year there was a roaring torrent. A prolonged dry spell had dried up the stream. We camped on the precise spot where we were last year and my bed was under the same cedar tree. Is it surprising then that this place seemed gratefully familiar, almost like home?

(On the 10th we travelled from twenty-two to twenty-five miles, covering the distance between our Beaver Creek Camp and the Rainbow Bridge. We lunched in Surprise Valley and bathed in a rock pool of the bubbling brook which, spring-fed, flowed on notwithstanding

ing the prevailing drought. (The government records note July as a rainy month in the Navajo Reservation, but on several occasions this did not coincide with my own experiences.)

All day long exquisite scenic marvels spread their inspiration before our eyes. The ever-changing contour of the abrupt and castellated northern flank of Navajo Mountain made us almost imagine that we were on a journey through the more serrated parts of the Rockies.

Although our trail skirted the mountain's lower slope we were high above the country to the north. Our view was unobstructed for miles and the San Juan River was easily visible. The colouring of the landscape suggested the hues found in petrified wood. The baldheaded domes of the slick-rocks stood out sharply, surmounted by the flat tops of mesas separated by dark, vein-like burrowings of minor canyons. The purple shades cast at random by floating clouds, the iridescence of distant mountain ranges, and the deep turquoise sky filled heart and mind with rapture over the glory of this Wonderland.

The Baldheads

The last hour of the stretch before we reached Beaver Camp was most trying. The entrance to and exit from Surprise Valley was difficult and the crossing of the slick-rocks called Baldheads, between Beaver Creek and Surprise Valley, was nerve-racking. On earlier journeys and before naming these particular

slick-rocks "Baldheads," Wetherill referred to them as the "Inferno." It takes fully an hour to cross them. They are an ideal place for losing a horse or a mule. Their slope, in most places, is too steep for man to advance on foot without the occasional help of his hands. One incident I recall. Billy, my horse at that time, was accepted as leader by the other horses, for they would run to him as though for protection, whenever they were in distress. I was leading Billy when, for some unknown reason, five or six animals became panicky; slipping, pawing, and stamping, they closed in on me, threatening to crush me between them, or crowd each other down to destruction. Fortunately I was able to extricate myself without mishap. But taking warning from this I have since always let my horse cross the Baldheads alone.

Purple sage grows in the crevices of these Baldheads. I also found it in the rocks at the easterly gateway of Surprise Valley, at the foot of a cliff ruin near by. I am told that it is to be found nowhere else, except in Kaibito. It blooms in May. This lonely messenger of joyful repose, a dark purple blossom with an orange centre, modestly peeping out of the cracks of its salmon-coloured rock home, thrills the traveller as does the edelweiss of the Swiss Alps.

The Rainbow Bridge

(For the last portion of the trip leading through Bridge Canyon the brook bed served as our trail, an

unsteady mass of rounded boulders of all sizes, composed of hard clay and soft sandstone, quartz, and clinky, knife-edged slate. No one relished the nervous watchfulness necessary to prevent slipping and injured ankles. Our packtrain, which could not continue the rough going with safety, climbed to a ribbon-like winding trail between receding shelves one hundred feet up the cliff wall. Wetherill and I, however, picked our way onward in the V-shaped gorge in the canyon bottom, unmindful of the hazards, for we were bent on the full enjoyment of the sublime, uplifting thoughts inspired by the Rainbow Bridge when first it bursts into view.

Objects to be compared must be like in kind. To line up and compare a blue-ribbon horse with a blue-ribbon cat, the Grand Canyon with the Yosemite, the ocean with Niagara Falls, all wonderful units, is as futile as a comparison of the Rainbow Bridge with any other natural marvel. There is no other arch yet found in nature to compare with it. There are other natural bridges, wonderful in their way, such as the Augusta, Caroline, and Edwin bridges in southern Utah; but they are distinctly *bridges*, and not a rainbow-shaped *arch*, a delicate semi-circle, free-standing on one side, on the other partly imbedded in the rock from which it was born. The dimensions of the Rainbow Bridge, its symmetry, its graceful sweep, its delicate balance, its daintiness, despite its bulk, its picturesque setting and colouring, make it an unique and stupendous monu-

ment. It is beautiful from whatever angle it is seen. How has this gem in high relief, carved as by a divine hand, withstood destruction by the very forces which reared it? Imagine a structure so massive that the evolutions of the ages have merely brought to the surface its muscular structure, divesting it of weak and useless particles. Where the strain is greatest, its contour suggests the arm and shoulders of a trained athlete. Where the weight rests on abutments, the latter suggest the virile forms of fluted, supporting Gothic pillars. Finally, conceive an arch so high in the clearing that the big Biltmore Hotel in New York, or the Capitol in Washington, could be placed beneath it without touching it. It is one of the most inspiring marvels of the ages. In the aborigines it created veneration, as is shown by two altars to be found there. How did all this happen? What forces were at work and how did these apply their Cyclopean strength? What is the substance of this material that responds so exquisitely to Nature's workmanship? How long will it stand? I still ask these questions, although men whose views I respect have often answered them to the best of their ability.)

Few concern themselves with geological and physiological features where vegetation and fertile humus hide the bare rocks; but here the earth ball is in complete nakedness, an open textbook of Creation. The traveller's power of observation is stimulated. He has no hesitation in putting the most awkward questions

to his more expert companions and in checking up their explanations. Each new vista offers opportunity for comparison. What is the origin of these queer rocks, their colour, their shape; the ridges, the strange canyons, the mysterious caverns with their weird echoes? My own version follows. I hope it may prove interesting to the reader.

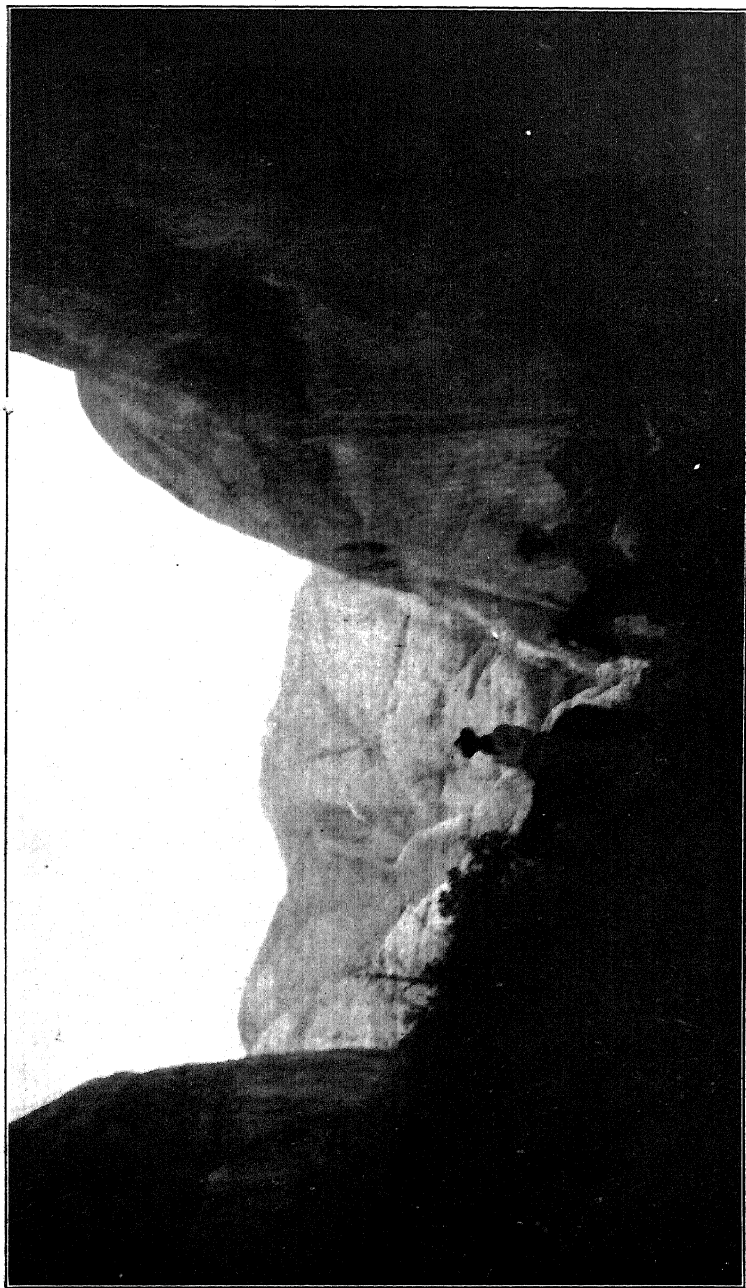
Over bed-rock a layer of limestone and hard sandstone was spread by an ancient ocean. This ocean bottom was lifted up some 5,000 to 6,000 feet. The loose sands, which were hundreds of feet thick, dried and became the playthings of wind and weather. Like the sands of the beaches they deposited themselves in cross-bedded, curving strata, to be blown off, deposited, and re-deposited, for hundreds of years. This age-long grinding of the wind gave the sands a uniform rounded structure and size. Their final resting place was provided by some unknown force; possibly a thorough wetting and covering by a flow of lava kept them in leash. This plateau-like crust of cross-bedded sandstone, with its layer of lava as a lid, now formed the level into which, in later geologic times, the present network of canyons was cut.

Navajo Mountain sends forth streams of water from its snow cover for six months out of the year. Thus furrowed valleys and canyons radiate from its central core, as the spokes of a wheel radiate from the hub. The water-courses cut deeply into the comparatively soft cross-bedded sandstone that has never had the

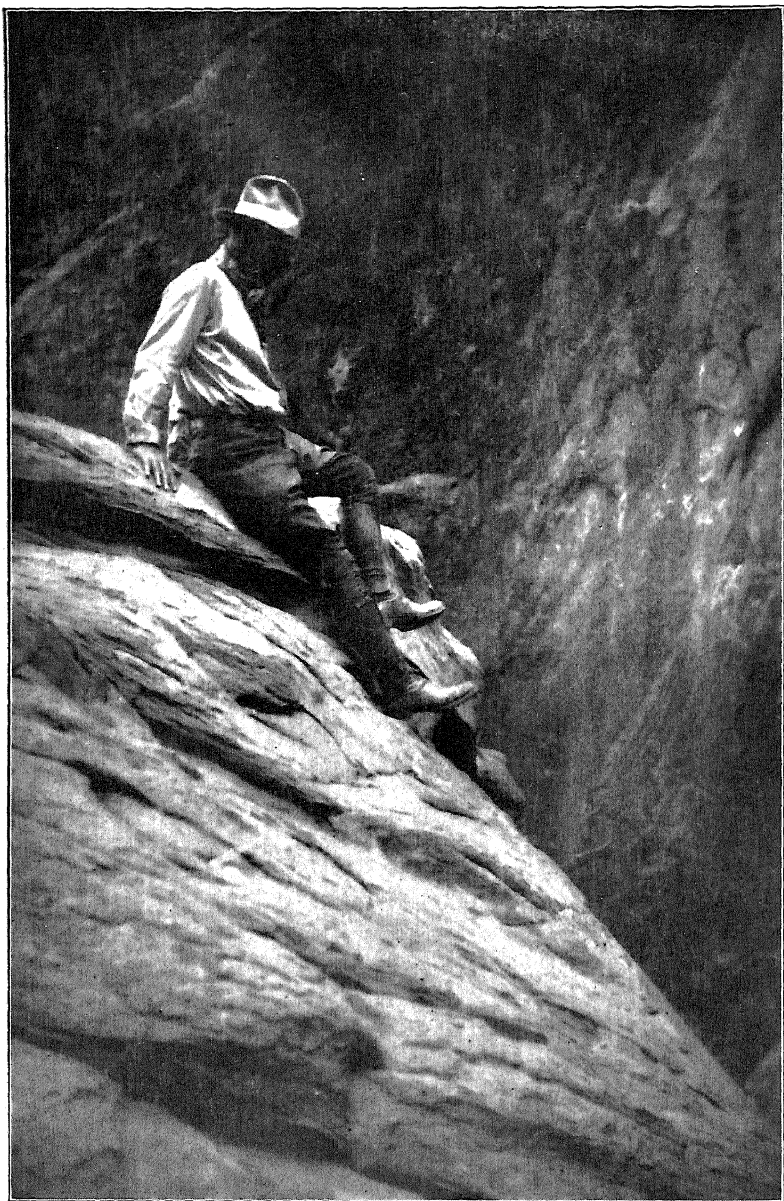
binding cement which the harder varieties elsewhere possess. The weather and wind-storms chiselled and rounded the domes, so prevalent here, which we likened to tabernacles, or mosque roofs. They are known here as Whale-backs and Baldheads. In the meantime the canyon walls remained perpendicular and massive. Here again the lack of binding material and the rounded uniformity of the sands composing the cross-bedded sandstones made a vertical breaking easy.

Somewhat more complicated were the causes which produced the Rainbow Bridge. The streamlet in the canyon called Bridge Creek had two channels, its present one under the arch and an ancient one some hundred feet higher. The old channel, extremely tortuous and meandering, was twisted in sharp and frequent loops from one side of the canyon to the other. Where it played long enough against an obstacle it formed caves. In one instance two such caves collided, their backs, or rear walls, broke through, collapsed, and offered a new and more direct channel for the waters. These widened out the hole and, in the course of time, even dug into the next lower stratum, the lime and hard sandstone underlying the softer, cross-bedded sandstone from which the arch is formed. Its peculiar chipping characteristic helped by frost, sun, heat, and wind blast, completed the process.

This theory is the result of discussions on the spot during my several visits to the Bridge. Some day



Red Bud Pass.



Scouting for water in the clefts near the divide in Red Bud Pass. Deep down in the slit were pot holes, the lowest of which, fortunately, contained water.

volumes may be written, by men trained in geology and hydrography, to explain this phenomenon. I understand neither of these sciences, hence this amateur theory is offered, with due apologies to those better qualified.

There are no human habitations, not even Navajos' nomadic settlements, within forty miles of the Rainbow Bridge. No doubt the difficulty of travel, even for sheep and goats, is the controlling hindrance. Plant life's immunity from extermination in Bridge Canyon is thus accounted for, and how gratefully the mute denizens of these rocky crevices respond! On every side they spread, bloom, and fill the air with their fragrance. In Bridge Canyon there is surface water the greater part of the year, and at all times there is sub-surface moisture in the Canyon. Several springs are known which, even during years of drought, sparkle under the over-hanging rocks along the canyon's bottom. There, close to the brook, masses of maiden-hair ferns grow in profusion, while numerous wild orchids of a green and pink variety nestle in the shade. Hanging on one of these we found a humming-bird's nest. It was no bigger than a plum. Bending it gently to look in we saw two baby birds the size of bumble-bees, their little mouths wide open. They had mistaken us for their parents.

In this canyon there are more varieties of plants and flowers than can be found between New York and Asbury Park. Indian paint-brush, whose dazzling scarlet

is visible at a great distance, no end of columbines, deep blue, light blue, and variegated; loco, lupines, daisies, asters, yuccas, sunflowers, milkweed, primroses, two-spiked plants with red flowers, which our botanist, Wetherill, called "standing cypress" and "scarlet bugler." I believe the latter belongs to the pentstemon family. The cacti are exquisite, ranging in colour from orange to lemon, even to a sickly looking green, from brick red to palest pink and magenta, while the texture of their petals is as delicate as the film-like mull skirt of the toe dancers in the grand opera ballets. We found the mariposa lily, in Utah called sago lily, in white and three colours, all intermediate shades between gold, pink, and lavender. It is called mariposa lily because the three-petalled blossoms perched on their thread-like stems wave and quiver, resembling in shape, colour, and motion a butterfly alighting on a flower. (Mariposa is the Spanish word for butterfly.) The name "sago lily" has this significance: when Brigham Young, the Mormon leader, took his flock in prairie schooners to seek new homes they were, at times, subjected to great deprivations. He discovered that the bulb root of the mariposa lily, when dried, furnished a wholesome starchy substance similar to sago. It is claimed that this discovery saved many a life on this pioneer expedition. Brigham tea, a wiry weed growing in the Bad Lands, is named after Brigham Young, who taught his people to use it in place of China tea. I have tasted this Brigham tea and found it as good a

substitute for tea as Postum is for coffee. All of these plants, and hundreds more, flourish in profusion.

A Hike to the Colorado River

That night we slept under the Bridge. On July 11th, after a good deal of photographing, we left on foot for the Colorado River, through Bridge Canyon which, about three miles down, joins West Canyon. The latter, about six miles from the Bridge, enters the big Colorado. The views on the way were exceedingly fine. The canyon walls rise sheer from six to twelve hundred feet, with caverns here and there several hundred feet deep. Those having a southerly exposure showed traces of having been used for more or less permanent habitations by the aborigines. Pyramid- and obelisk-shaped rocks jut upward from the sand dunes; rubble-covered canyon bottoms in narrow dark defiles alternate with open cottonwood and willow glades. Minnows and cat-fish abound in the pools in the drying-up watercourse. Altogether the beauty of this six-mile stretch equals, and in places exceeds, that of the picturesque and often described Canyon de Chelly and Canyon del Muerto.

The Colorado River was still turbulent and muddy. It is possibly six hundred feet wide at the mouth of West Canyon, and the shores are rocky and bold. We could see two sweeps or turns. It looked as though the river might be conveniently crossed at low water over a gravel bar which during floods forms rapids.

The twelve-mile walk going and coming in the hot and brilliant sunshine, more intense because it was reflected from the canyon walls and frequently alternated with dark, cellar-like defiles, was most trying, especially as much of our path led through loose sand and river pebbles. I had to stop constantly to empty my shoes of sand, but that did not avail. Wetherill, ever ready with a remedy, asked for my shoes and gave the soles a thorough bastinado, causing rivulets of sand to pour out. The sand must have worked in between the stitching and had accumulated between the layers of the soles. I returned his helpfulness with one of another kind. We all frequently washed our faces in the cool brook, but it did not help; so I suggested that they shake their dampened handkerchiefs in the air thus chilling the moisture and then apply them to the face and head. This little trick I learned from Mother Necessity on the S. S. *Antilles* while coming as a refugee from Genoa in September, 1914, when ice was scarce. My little daughter Alice was down with typhoid and it was imperative to keep her cool.

Our return to camp found us weary and footsore, and I thought I was played out; but, after applying zinc salve and iodine to various scrapes and bruises, all of us went on taking pictures. July, out here, is usually a month of many storms, and as the sky was threatening we thought that the following morning might be less propitious for photographic work.

(The night was very close and, fearing rain, we made

our beds between rocks right under the Bridge. It was hot, with occasional whirlwinds blowing up the canyon from the Colorado River. These were not unlike blasts from the mouth of a furnace.

Homeward in 1921

Lunch hour on July 12th found us in Surprise Valley, about eleven miles from the Bridge and homeward bound. The trip to this point had meant great exertion in climbing rubble and sand covered slopes hundreds of feet high; here we were compelled to lead the horses. These ugly trails are usually encountered in crossing from one canyon system to another, and for a "tender-foot," when at elevations of from four to seven thousand feet, they mean considerable puffing.

After leaving Surprise Valley we renewed our experiences with the dreaded slick-rocks, but these seemed tame compared with some of the ledge-travelling we had done (near Crouching Camel and) between Goldenrod Canyon and Endische Spring.

At six-thirty we were back in our old camping place at Beaver Creek, having been in the saddle for seven hours. The cached supplies were intact and the two injured mules we had left here to recuperate were on the mend.) All along we had had three animals in excess of our actual needs. This is one of the many precautions necessary, for animals may develop sore backs or become lame and also the regular steeds need an occasional rest. My faithful mount, Old Reliable,

kept up beautifully. Perhaps this was because I am a "lightweight" and certainly I gained no flesh on these jaunts.

A real storm was coming, our first since entering the desert. The need of rain was desperate. The most hardy desert plants looked dry and wilted. Were Beaver Creek to be swelled by the storm it would have had to rise one hundred feet to reach our camp. In case of a cloudburst, the horses could be depended upon to get out of the creek bottom, should they be drinking or grazing there.

The morning of July 13th was spent in horseshoeing and renailing shoes which had become loose. Two difficulties were encountered: first, there were not enough horseshoes, and second, the hoofs of some of the animals, which had been barefooted up to this time, were worn down to the quick, so that nails could not be driven in without injury. The situation was awkward, but were we not meeting constantly problems which had to be solved? The obstacles were not all behind us. There were still three important canyons to be crossed: Piute, 1,500 feet deep; Nokai, 2,400 feet, and Copper Canyon, 1,000 feet deep.

The rain fell for about three hours. Wetherill and the rest pulled their tarpaulins over their heads and let it rain. Johnson, mindful of his bunk, myself, stretched his tarpaulin in tent style over a rope between the piñon pine that had given me shelter repeatedly and a shaggy old cedar. We kept perfectly dry.

Piute and Nokai Canyons

Although we got up at five-fifteen, as we did every morning, because of the horseshoeing we did not leave Beaver Creek Camp until ten o'clock. We rode around the north slope of Navajo Mountain. A bit south of Navajo Bega, near a deserted Indian corral, the trail divided, and we followed the easterly fork which led toward the lower crossing of Piute Canyon. Last year, both in going to and returning from the Bridge, we crossed Piute by way of the upper crossing, to reach which it is necessary to take the trail which runs due south.

About one-thirty we climbed down into that canyon, a deep and wide slit in the earth's crust, Wingate sandstone six hundred feet thick at the top; Chinlee formation with its variegated colours, red, verdigris, cream, and white, another six hundred feet thick beneath it; traces of shinarump conglomerate still farther down. The descent was not dangerous at any time, but as we walked much of the way we were hot and fatigued. The Indians who had made the trail for their own use had done remarkable work and deserve great credit, but one should always remember that it is an Indian trail and as such would break the neck of any animal except one trained from birth to claw the rocks like a goat. In a ravine a short distance from the bottom of the canyon we came to a good spring and some cottonwood trees for shelter. Here we rested for luncheon.

At four o'clock we started across the canyon. We passed a few apricot trees and some corn and melon patches planted by Piutes. The ascent of eighteen hundred feet was over a very fatiguing trail, but one good enough to allow us to remain on our horses. It certainly was a hard pull for them. At seven-thirty, on a mesa facing Nesca Valley to the east, we made camp for the night. This spot was chosen because we found some shallow depressions in a sandstone outcrop containing rain water and good grass near by for the horses. The view of the surrounding country with rainbow tones veiling all distant points, Henry Mountain in the north, Boulder Mountain in the northeast, Fifty Mile Mesa in the west, and Navajo Mountain with its lacerated north slope, in the southwest, was beautiful beyond my capacity to describe, and was made doubly impressive by the exquisite rain-cloud effects in the sky.

Our next objective was Kayenta, our starting point, which we planned to reach by noon on the 16th. This meant about twenty-two miles a day, saving our animals more than ourselves, for we had become hardened adventurers, both as to endurance and fearlessness. The food was low, with choice reduced to a minimum. All the country to be covered on our way to Kayenta was new to me, for last year we travelled by way of the shorter, more direct trail far to the southward.

It rained again the night of the 13th and 14th, but not very hard. We had prepared for a cloudburst.

Johnson roped together two cedar trees, threw his tarpaulin over them, and made our beds inside. The tarpaulin, now full of rents, was held down at both ends with sand and stones while the two trees protected us at the open ends. My slicker and a big sheet of rubber cloth, which, by the way, always proved useful, lay next to me for extra protection in case of a leak, and my clothes were wrapped securely in another sheet. A ditch around the tent, to carry off the water that did not soak into the sand, provided for further emergency. We had ants in our bed all night, but being used to the small brown variety they meant merely annoyance.

Our start the morning of the 14th was east to the brink of Nokai Canyon. The walls were straight and threatening, 2,400 feet high where we had to descend. It took us from ten to twelve o'clock to make the descent. The deep ragged trough was void of vegetation. It had a rain-swollen, terra-cotta-coloured stream, thick with mud, flowing in the bottom. Its water could not be drunk by either man or beast. The scenery was gorgeous and the colour effect extraordinary. It reminded me of the many colours of a vegetable soup reënforced with strips of bacon, a realistic if not romantic comparison.)

Food Supply Getting Low

Speaking of food, I am irresistibly tempted to refer once more to my menu. Luncheon to-day consisted of soup, a mixture of corn, tomatoes, and some Steero

cubes, into which some cheese was melted. Sardines, another can of tomatoes, and canned pears, together with Johnson's biscuits, rounded out the meal. My own was supplemented by two strips of bacon, four soda crackers, and some prune jam. The supply of bacon, soda crackers, and jam being very low, the men insisted that they constitute my special preserve, because I do not as a rule eat canned tomatoes, sardines, or even Johnson's famous biscuits.

(We had our lunch in Copper Canyon, crossing not far from the shore of the San Juan River into which the streamlets of Copper Canyon, as well as of Piute and Nokai canyons and Nesca Valley drain. The water which we were able to get for drinking purposes was very good. It was rain water collected in hollow rocks.) My advice to those who suffer distress from too much alkali-tainted water is to seek, during the spring months, melted snow remnants, and during the summer or fall months, stray rain accumulations in rock holes.

(Coming out from Copper Canyon one is greeted at the left by a basilica-like temple, with what looks like the headless figure of a woman at the corner of its roof. The proportions are perfect, the draperies gracefully flowing, and the bare arms curving slightly backward. On the south side of Copper Canyon, as it merges with the plateau on which stands Organ Rock, there is a cove with formations resembling the utensils and paraphernalia which we associate with a breakfast

table. Hence we named the cove Breakfast Table. There is a tea caddy, a perfect sugar bowl, with bee-hive-like cover, and a teapot with handle, spout, and cover. Now that our supply of food was getting low, everything we saw reminded us of eating.

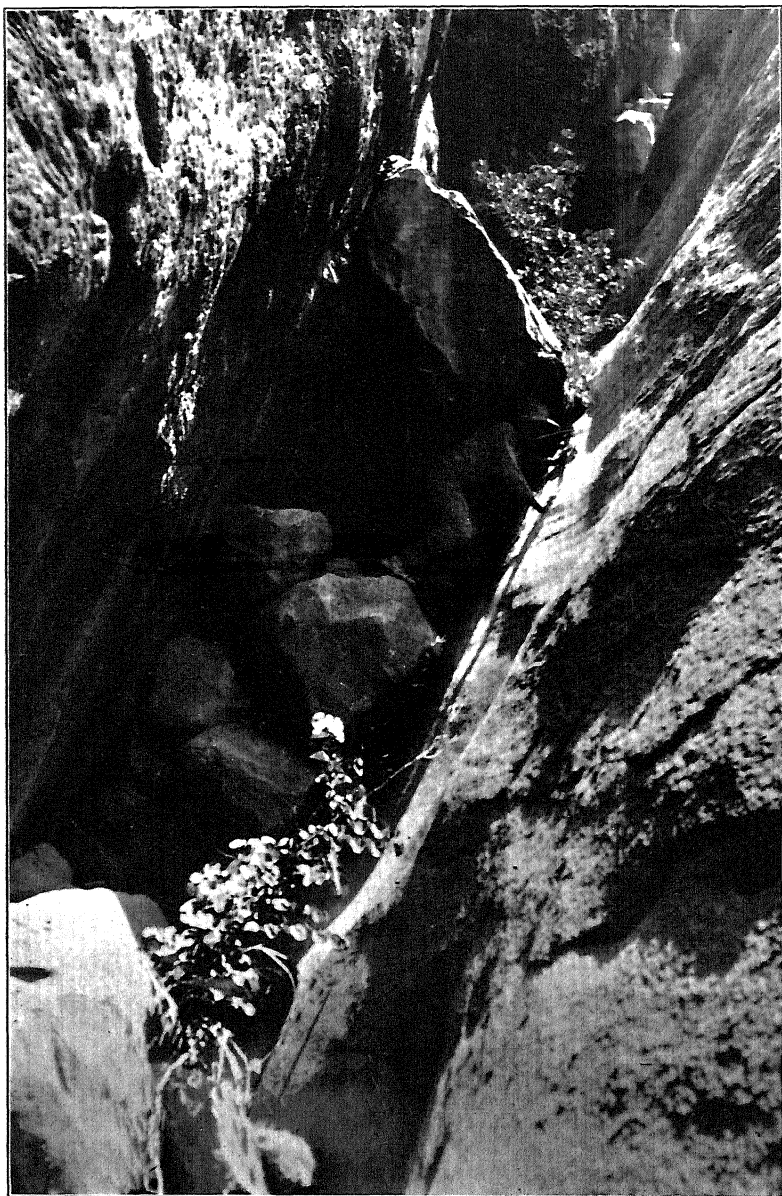
We made our camp on the plateau two miles distant from Organ Rock. We had not time to get nearer, especially as it would have necessitated crossing a deep canyon, which meant too much delay; but we had a fine view of the great monument which stands alone, resembling an obelisk from the west, and from its broad south side a huge organ screen.

Expecting rain, we erected the usual tarpaulin protection. Morris named this Tent Camp. I called it Teapot Camp. The preparations were needless. Our last and homeward lap was begun at eight o'clock in the morning. Along the westerly edge of the southern portion of Monument Valley we trailed, skirting the easterly side of Skeleton Mesa. It was a tedious, uneventful trip excepting that while the caravan proceeded, Wetherill, Morris, and I took a side run westward into a recess of Skeleton Mesa, also called Segi-ot-sosi, to see a very beautiful cliff ruin, "Snake House," so named because of a fifty-foot snake carved on the rock. Late in the afternoon we skirted the west slope of the volcanic spine Agathla, a rock rising majestically, sheer and lonely, twelve hundred feet above the desert floor; and at six-thirty in closed rank we filed into Kayenta, having completed a successful, interesting,

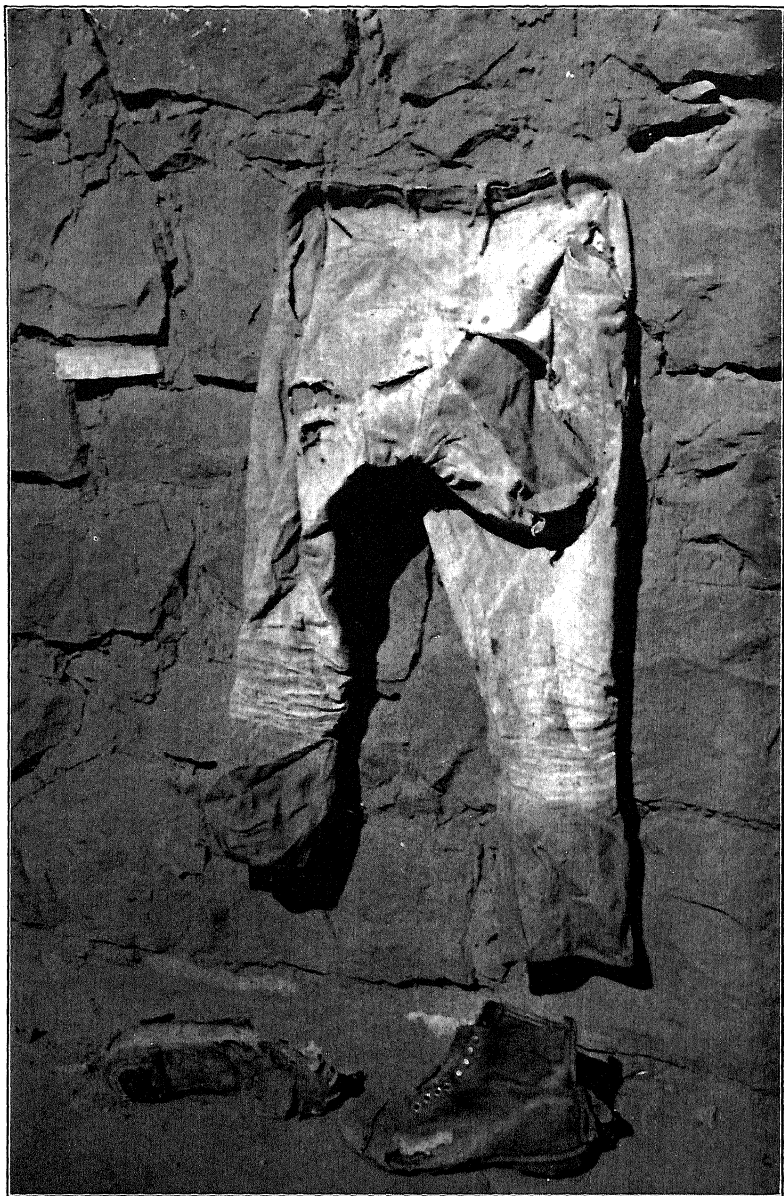
instructive, health and character building journey of discovery.)

Much new territory, never before visited by white man, had been covered. Many erroneous reports can now be corrected. A large number of formerly nameless places, canyons and mesas, have received appropriate names which we hope may become permanent. The Colorado River was reached at the foot of Sirocco Pass, and again at the mouth of West Canyon. Had not our time and supplies been so limited, we would also have reached the spot where it is joined by Navajo Canyon. We are all convinced, however, that the last ten miles of Navajo Canyon, the portion which we did *not* cover, is not more difficult to travel than the stretch between Jay-i and Barricade Ruin. We found a rough and dangerous trail, till now unused by white man, between Jay-i and Clematis Camp, in West Canyon, and from there over to Endische Spring via Goldenrod Canyon. We also found that to travel with horses or mules in West Canyon below Clematis Camp is not practicable without extensive trail-making. In addition we ascertained that Navajo Mountain cannot be passed on the westward side with animals.

THE 1922 EXPEDITION



This represents the type of climbing, called good, necessary to reach the top of No Name Mesa. The men returned with lacerated hands, legs, and faces. Their clothes, as such, were unrecognizable.



Earl H. Morris's riding breeches and shoes, after climbing No Name Mesa, deserve a place of honour in the American Museum of Natural History which he represented on the author's expeditions.

changing conditions are not conducive to lasting trails. Then, too, an attempt to build a trail there would have no warranty except adventure.

After a few seasons' work on the new trail the trip to the Bridge should hereafter encircle Navajo Mountain via the less fatiguing westward trail in going, using the eastward trail on the homeward stretch. I make this suggestion, for by the time the cavalcade is ready to start homeward both muscles and nerves have become hardened. The question of water, I am sure, can be solved by search, and, except in extreme cases of drought, should not be a deterrent; always provided, of course, that parties are properly guided, provisioned, and equipped.

(The month of June, 1922, saw us once more on the trail: a paradise for the fault-finder, for here he would have plenty to find fault with, in the "Land that God forgot," to use the language of my guides, who have an eye to good grazing and hunting grounds; but a veritable storehouse of delights for the sympathetic explorer. The barren broken rock jumble beckons to the imagination; the disorderly, unsymmetrical ruggedness dispels the inertia following another trying year of city life. A little oozing canyon spring which the sandblasts of ages have overlooked becomes a fit object for veneration. A patch of grass is a thing of beauty, a camp at the end of the day's trail, the hope and aim of the traveller.

During the night of the 24th and 25th of June we

camped in Marsh Pass. On the 25th we started upstream in Sagi Canyon. Our descent from the sand bench on which we were travelling was at an unused place. Johnson was in the lead, and the first to be laid low in the quicksand at its bottom. Both he and his horse pulled themselves out coated with brown ooze. The other members of our cavalcade fared better by avoiding the pitfall into which he had strayed—except one mule, which with its heavy pack got in deep and was rapidly being sucked down. After cutting off his load, four men with the aid of ropes and shovel pulled him out. About seventeen to twenty miles represented that day's progress.

This was not the end of our troubles. Another trying experience was still ahead of us. Suddenly, and so far as we were able to tell, for no other motive than a mule's reason, one of our young mules started on a rampage into the trees and bushes, then out again, then headlong amongst the already excited animals, spilling and smashing all it carried, and finally making off into the canyon. Two of our best men were hours tracking him and eventually brought him into camp. Such experiences are likely to endanger supplies. Fortunately they occur mainly at the beginning of a journey when the animals, green and unused to their task, try to divest themselves of their loads by means that to them seem best.

(Our camp site that night was an ideal spot from the scenic point of view, but from that of the camper

neither comfortable nor safe. There was very little level ground and hardly enough elbow room for unpacking and repacking our loads. The trees were too close together, the rocks jutted out every few feet, and the whole conformation was an ideal place for a washout should a cloudburst occur during the night. The spring in the vicinity of the camp was, however, the controlling factor, and the chance had to be taken. Baggage was stored on high places and our beds were all but level and comfortable. Ten or twelve towering Douglas firs in the apex of the rocky cove which for short we termed "Spruce" were sponsors for the name "Spruce Tree Camp." These trees are marvellously beautiful. Two to three feet thick and seventy-five feet high, they towered up in their magnificence, while quaking aspens in plenty, with their whitish trunks, helped to cheer the scene. The clear, cold spring water was most refreshing and my men declared it to be of splendid drinking quality. The Navajo tribe must have used this wind-still spot as a sanatorium for the rejuvenation of their aching bodies, for we found a "sweat house" neatly built into the side of the canyon. We have come across like contrivances elsewhere, so a word or two regarding them is proper:

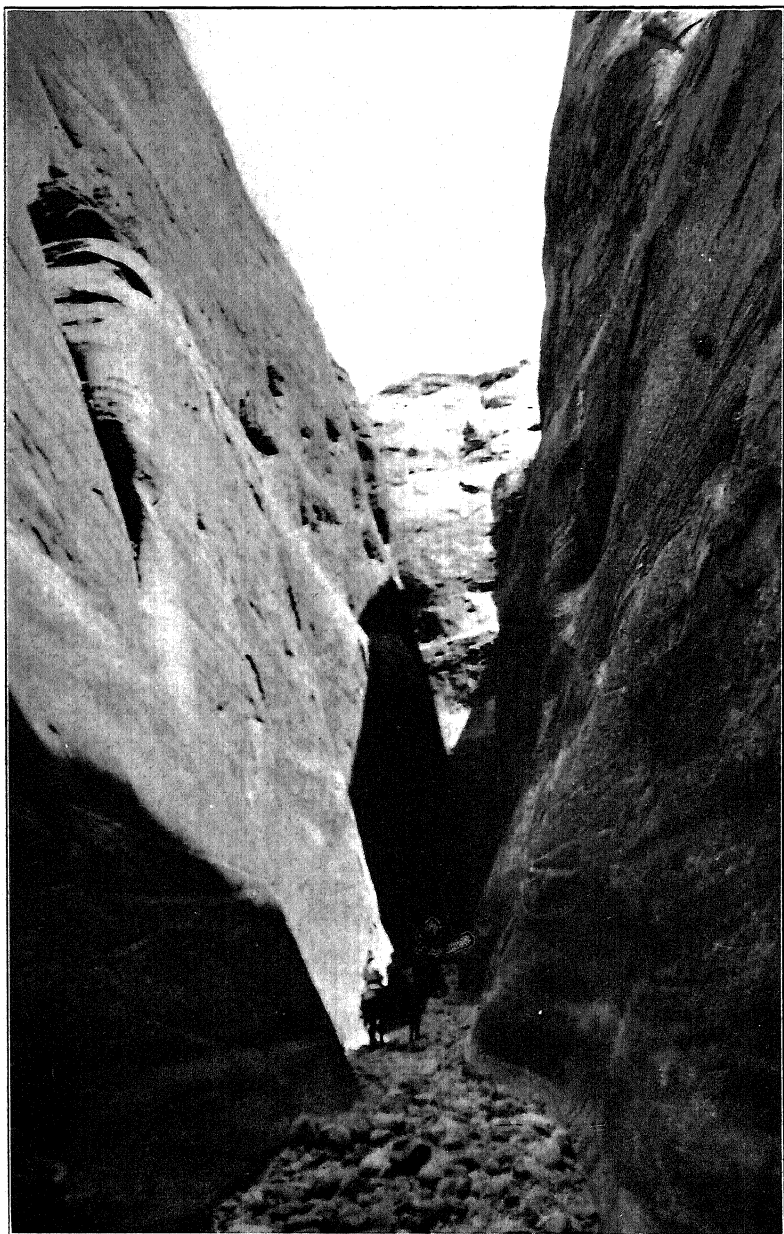
A small square-topped entrance leads to a low-ceilinged chamber about six or eight feet square. The Indian places heated stones, and sometimes jars filled with steaming water, in it and closes the entrance with a blanket. In this heated place he stays for hours at a

time. I have seen them emerge with their skins bleached. It is their equivalent for a Turkish or a Russian bath. No doubt the water pool under the spring could have supplied facilities for a cool plunge, but I doubt whether their hydrotherapy went that far.

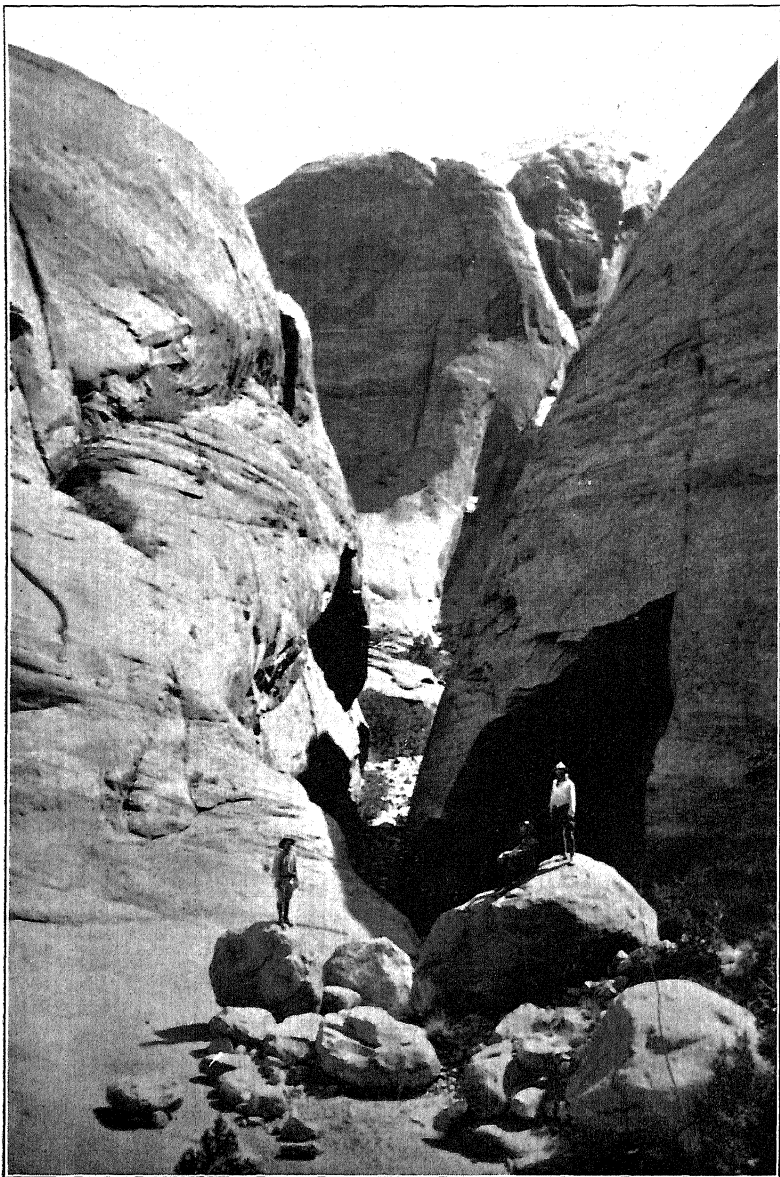
Big black ants abounded near our camp, but as they were the "early to bed" variety we had no fear of their visits at night.

Rough Trail Camp

(On June 26th we travelled only about seven hours. We were delayed in starting because of our blacksmithing. Many of our animals left Kayenta barefooted. Every day some of them received shoes; besides, in the crowded quarters of Spruce Tree Camp the loading and handling of eighteen pack animals was an Herculean task. (We rode through the heat of the day without even stopping for lunch.) Johnson carried a small flour bag containing some crackers and cheese. This we divided and munched while riding. Our table manners were perhaps a bit shocking but they were probably not inferior to those exhibited in the days of Charlemagne and even later, before forks were invented. Roughing in the open has a tendency to bring to the surface latent methods and manners, which we are accustomed to associate with past ages. I do not believe that this represents backsliding in the scale of civilization. It is rather a needful adaptation to inexorable conditions. For instance, in the early years of my



The troublesome trail through Nasja Creek.



The end of the trail in Nasja Creek. The water course had changed its lodging to a lower story and the canyon, no longer needed for its channel, had closed its gate. Note the rock formations reminding one of elephants, etc.

Western travels I wore linen collars. They gave way to celluloid collars, which merely had to be wiped off with soap and water for cleansing. Soft collars followed; finally the coloured cotton bandana replaced all others (not the silk sort, which we associate with the toilet of cowboys and Western frontiersmen). These I found served the purpose admirably, cool if loosened, and spreading a cheering warmth over the entire body if tightened.

A hunt for water ended our day's journey. A steep, rough trail took us down into a hollow where we hoped to make camp for the night. We dug for water in two likely places but found only moisture, none of the oozing, thick oatmeal-like mud which we hoped for. A scouting along the hollow, where it suddenly plunged into Piute Canyon, disclosed a long chain of pot holes, the lowest of which, fortunately deep, contained a good supply of rain water, that most precious of all waters out here.

Because of the difficulty of the trail which led down to it we called this "Rough Trail Camp." A more appropriate name would have been "Lost Bucket Camp," because a bucket slipped and sank while we were drawing water out of the deep hole. Johnson recovered the bucket by diving for it, all hands lending aid to get him out.

Sagito

In 1922 our real start was made after we reached our camp at Sagito, in a cove on the flank of the southwest edge of Navajo Mountain. We debated long as to the

name to be given this buttress, which looked battered and shattered as we approached it. "Anthony's Nose" was suggested, but that was tabooed because his nose was supposed to be aquiline and perfect. "Prize-fighter's Nose" would have been more appropriate, but this, too, was discarded. The scenery itself helped out. We espied a white cupola perhaps a hundred feet high of perfect contour. Our Mormon friend promptly announced, "There is the Tabernacle," and "Tabernacle Point" was accepted.)

A small Indian family makes its home in Sagito. The brave's name is Sagi-nini-yazzi, meaning "the little man living in the rocks." We engaged his services, believing he would be helpful to us, but soon found he was not. I think he was induced to join us not because of the wage but because he thought that by this means he could locate new grazing grounds for his sheep and goats. As this in turn would destroy all wayside grazing for the pack animals of those following us, there at once loomed the great problem which dominated the struggle between cattlemen and sheepmen in our Wild West forty years ago. Sheep- and goat-grazing destroys the land for horses and cattle, because the sheep and the goats cut the grass too close, thereby killing the roots.

Scouting and a Decision

(The camp at Sagito was excellent. The day following our arrival we started out scouting northwest, leav-

ing our pack animals grazing near camp. A sharp ridge was easily crossed, but beyond yawned a deep canyon. There was no trail down, but down we went afoot, pulling our horses after us or being crowded by them. The opposite side, even steeper and also trailless, had to be climbed afoot, the horses sometimes led by the halter, but more often not, for we needed hands and feet to pick our way up. Once on top we were confronted by another drop, not quite so deep, which necessitated a repetition of the previous performance. Then came a flat stretch. This we followed, keeping close to the bulk of the westerly slope of Navajo Mountain. We were wrong in choosing this direction, but it had its advantages, for we kept the high altitude and were thus enabled to survey the ground. On a high ledge, at last we were able to grasp the problem. Before us was No Name Mesa, red and bold, a wall three miles long without a break, separated from us by a shelf of broken-up rock masses, which in turn were dominated by obelisk-like spires. Deeper down, close to the flank of No Name Mesa, was a cleft of unknown depth. No Name Mesa was connected with Navajo Mountain by a yellow ridge of the knife-edged type, plantless and steep. This ridge—"The Saddle," as we called it—had to be crossed either where it joined No Name Mesa, or at a place somewhere near the main body of Navajo Mountain. We had little hope of doing the latter because the broken-up boulders of the buttresses were sure to bar our way. Afoot, Wetherill

started down the ravine separating us from the Saddle, between No Name Mesa and Navajo Mountain. We could not tell how soon he would reach a conclusion but we knew that he would give us a smoke signal to indicate his whereabouts. Two hours later we saw the smoke. Al and Jess followed it. When we had reunited we knew what had to be done but the how remained an enigma. We returned to camp two hours before sundown. Fortunately the July sun sets late and the dawn is long. All hands set to work making a semblance of a trail up and down the ridges for our pack animals to cross. It is surprising how much can be accomplished in a short space of time with strong, willing hands, shovels, picks, and crowbars. Needless to say the desert man knows instinctively the easiest way for trail-making. With him it seems to be a sixth sense. Of course the result was not a trail in the accepted sense of the word. It was merely a direction eliminating the most awkward spots. It answered our requirements when on the following day our advance guard and part of our caravan crossed the canyons and their intervening ridges. All of this passed without serious mishap, but we had yet to get down into the cleft between No Name Mesa and the broken-up plateau to the south of it, which we had observed the previous day and picked out as our line of approach to the Saddle. We got down into the cleft after many an anxious moment.) When I think of those poor brutes carrying our loads (and they were of no mean weight),

taking leaps three or four feet down some narrow defile with scarcely any room for them to move and hardly any space to place their hoofs, I wonder of what sort of material their spines and legs and sinews are made.

Crossing the Saddle into Cliff Canyon

Once we were in the cleft we found it not only deep but rather wide. Part way toward the Saddle we came across a huge dome, half of which had been broken off. This determined the name "Half Dome Canyon." As we reached the base of the Saddle we struck an old, disused Indian trail. I call it a trail because in a few places we found stones where nature would not have placed them. They must have been so arranged by human hands at some time in the dim past. They were indicative of direction but not of any footing passable at the present time. A climb up the Saddle was before us, a thousand feet of it. The July sun was beating down on us who were the only dark specks on a steep, cream-coloured slope of loose stones and sand, a moraine-like dike. It was a severe endurance test for man and beast. The animals were finally assembled on top of the Saddle. A likely place was selected for the advance down into deep Cliff Canyon which lay ahead of us. The descent, over rolling rocks and sliding sands, around boulders and roots, had its thrills, for a caravan of so many animals must be kept moving at a fairly even and rapid pace or chaos reigns.

Sliding loads, kicking, biting, and crowding horses

and mules and dustclouds completely obliterated all thoughts of weariness, dizziness, or danger. It required complete concentration to take us down some 2,500 feet, over a steep and apparently impassable slope.

It was late in the afternoon when we reached the bottom of Cliff Canyon, so named by us because of the sheer cliffs which line it. The heat was "Julyesque." The streamlet in the bottom was dry. Our animals had had no water since early in the morning and there was practically no grazing on the wayside. My half-gallon canvas water-bag was less than half full; no one of us had ever been there before; we did not know when water would be reached. To turn back was impossible. Confronting us was the unknown.

The canyon was parched and thirsty-looking. Even the cacti, those reservoirs of moisture, were shrivelled and shrunken. I had been pondering as to the best use for the little water left in my bag; my companions had none whatever. Would it be sufficient to moisten the noses and mouths of our animals next morning, so that they might be able to drag on, if need be without load?

Such lugubrious reflections kept tormenting me for hours, when suddenly, at about sundown, a silvery shimmer far ahead, a catching and reflecting of the departing sun-rays, heralded the presence of water. "To," which in Navajo means water, and "shineago," which means food, were on our parched and chapped lips.

We knew we could pitch a camp here and that from it we could reconnoiter farther for a passage east through some cleft in the rock cliffs which we had to put behind us if we wanted to succeed.

Painted Rock Camp. Assessing the difficulties ahead

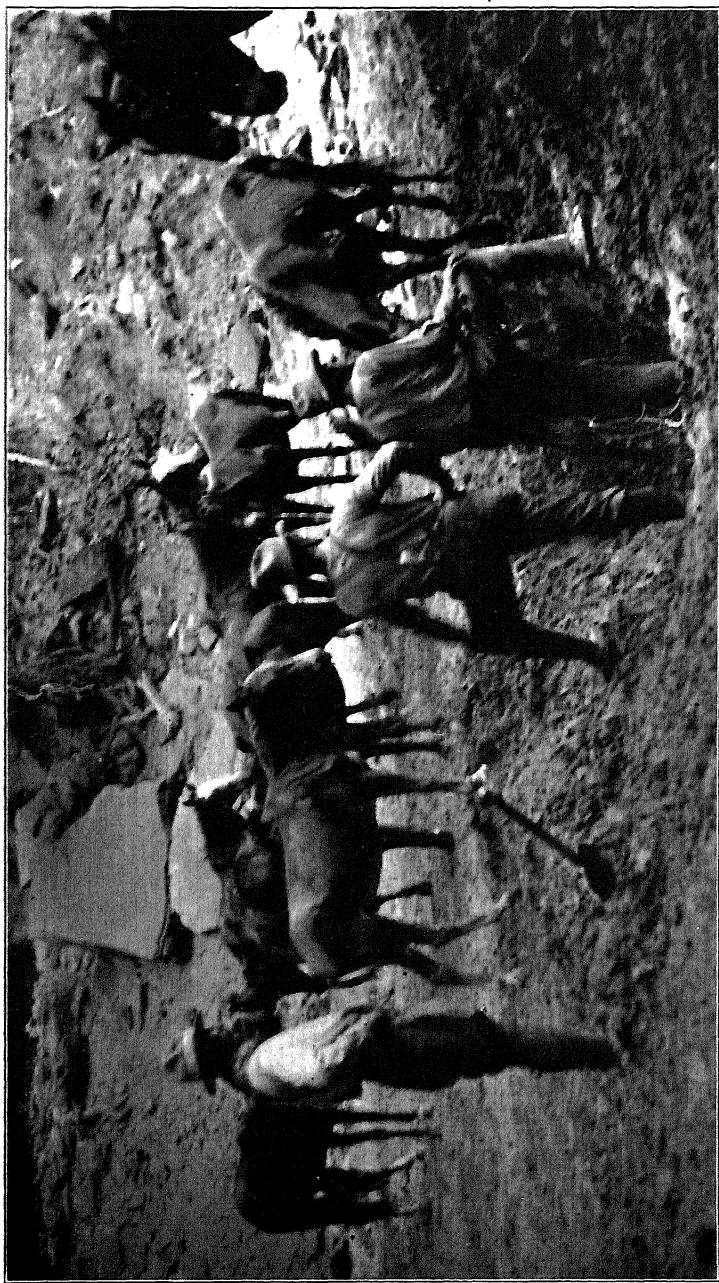
Next morning we shifted our camp a mile or so farther down Cliff Canyon into a small grove of cedars and piñons. We named it Painted Rock Camp because of drawings in three colours, red, yellow, and black, on the rock face near by, above a cliff-ruin site. The type of drawings indicated that it was the former home of basket-making aborigines, who belonged to an era preceding the pottery-makers. Here we had splendid water for drinking, rock pools for bathing, and our animals had fair grazing, an important element in our calculations, for we were sorely in need of the feed by the wayside to conserve the 1,500 pounds of oats which we had brought from Kayenta, where we did our outfitting.

On June 30th we commenced reconnoitering to the east. The most hardy of our little band went to find an opening through the easterly cliffs, while Johnson and I went downstream to ascertain where it led and to verify our suspicion that our Cliff Canyon Brook emptied into Forbidding Canyon. This suspicion was well founded. Two miles downstream we reached the notorious Forbidding Canyon, which promptly exhibited all the characteristics so well known to us.

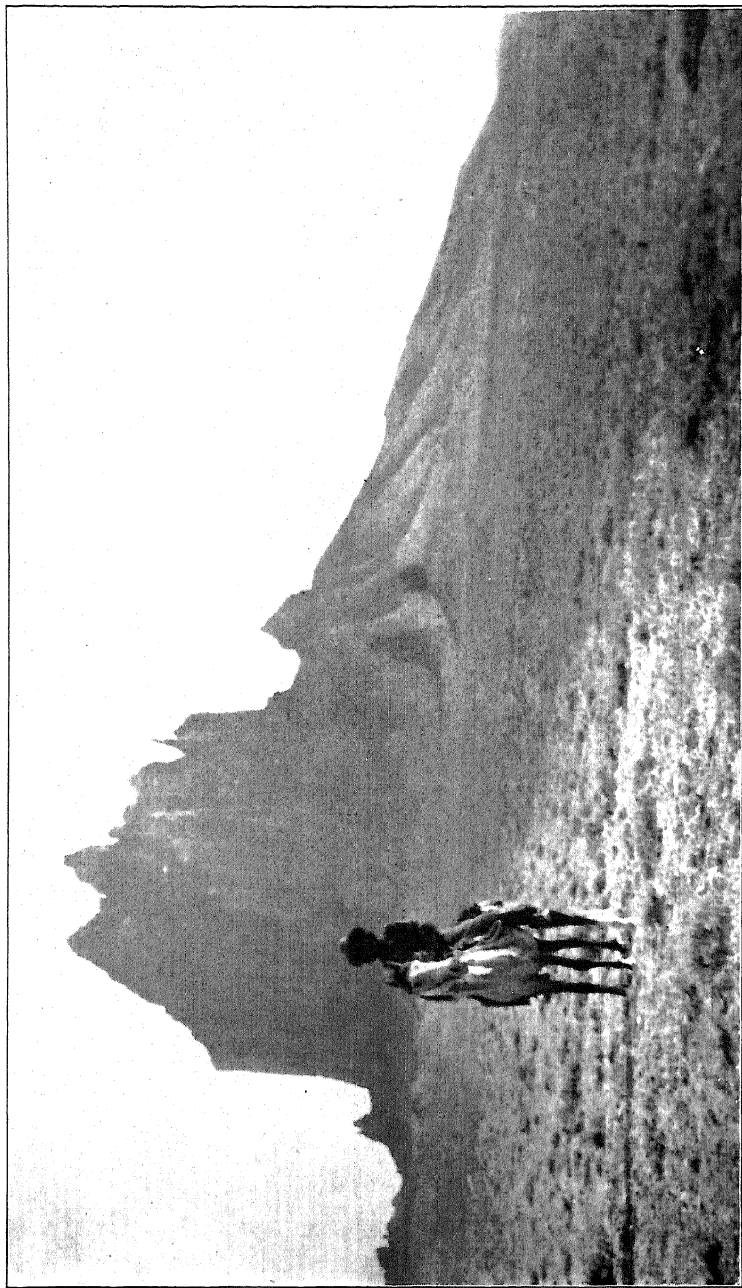
Its course soon became impassable for animals, and a bit farther almost so for man, unless provided with rope.

Wetherill, Morris, and Jess reported the result of their scouting. Johnson and I did likewise. We compared notes, measured difficulties in terms of time, tools, and T.N.T., food, water, and feed. Johnson and I advised against any attempt to follow in the direction we had gone in Forbidding Canyon. The other way of getting through represented merely Hobson's choice. The Wetherill scouting contingent had found a cleft in the canyon wall pointing east. Prepared as we were for rough work, not minding the chopping down of trees and brush, the breaking or even removing of rocks strewn in the narrow defile in order to make it passable for our animals, we were not baffled when we came upon two places where the rocks of the pass had closed up, barely allowing a man to squeeze through and absolutely impossible for horse or mule. Those obstacles were minor, as was the forbidding head of the pass that culminated in the divide between the Cliff Canyon and the Bridge Canyon systems. The head of the pass was a steep mass of loose sand and rolling rocks, with narrow ledges dividing one knoll from the other. I climbed it while the men were clearing the trail behind. The altitude of about 4,500 feet was not too trying. It was noon and hot. There was no wind.

The thought of the trail we had to build upon this slipping sand and rock pile was not comforting but the men made light even of this task. The real surprise was



Zane Grey Canyon. Digging a trench for water. Note the expression and attitude of the thirsty animals, craving for a bit of oatmeal-like liquid in lieu of water. The effect of the hardships they have undergone is seen in their emaciated condition.



Shiprock as seen from the north.

ahead on the far side of the divide. Sand and loose rocks changed to rigid masses. The very skeleton of the mountain was laid bare by the raging wind blasts from the east. Deep down, far off to the east, were green tree tops, our beckoning Mecca. At first view it appeared innocent and cheerful enough, but the "how" soon became the all-absorbing thought. To the left rocks, wedged in vertically, blocked the descent. To the right was a slick-rock hump, which was separated from the canyon wall by a slit. In the bottom of this were ten or fifteen cists, or pot holes, filled with dry sand, but the lowest, placed just where the slit abruptly ceased to exist, fortunately contained a fair supply of water, the remnant of winter snow or spring freshet.

Trail-making down this slit was impossible. With our supply of T.N.T. and dynamite and ordinary hand drills we could not displace one-quarter acre of rock. It was evident that Nature was going to demand Shylock's terms, that we must give up or pay up, bartering results for T.N.T., dynamite, drilling irons, hard labour, and risk. Our men were full of the same spirit which animated the early pioneers. Wetherill planned and directed the tedious hand-drilling and blasting. More than once we bemoaned the fate of the poor lizards, the lonely inhabitants of these distant wastes whose homes and life we were destroying. One of the rock wedges to the left had to be blown up, as well as part of another and the dislodged masses plunged down to fill a deep and wide-gaping hole beyond. To smoothe and

level the débris so that our success would not be merely a Pyrrhic victory, ending with maimed and incapacitated horses and mules, was an added phase of the task before us. The spectre of a stampede at this spot was constantly in my mind. We took three days for this part of the work and these were not eight-hour days, nor was there sabotage or slacking. In grateful recognition of a red bud tree which furnished us with strong and tough crowbars, without which our work would have been greatly retarded, we called the link between Cliff Canyon and Bridge Canyon "Red Bud Pass."

July 5, 1922, was a red-letter day. We rode over the pass without pack outfit and through glorious scenes reached Rainbow Bridge, thus realizing the dream of years, of encircling Navajo Mountain and reaching the Rainbow Bridge by a new route. Wetherill assures me that it will become the easier and shorter route, probably ten miles shorter than the trail to the east of Navajo Mountain, after some work in trail-making. For a number of years Wetherill has kept a book in a niche in the Bridge where packrats, those scavengers of the desert, cannot destroy it. A record of our performances was entered on the book by Wetherill. This was my third visit to the Bridge and I hope that it will not be my last one.

Two days later we took all our animals, without packs, over the new trail. We had many anxious moments but nothing serious happened. A few of our

horses were sick or sorely in need of rest; these were left to their own devices near the junction of Red Bud Pass and Bridge Canyon, where Wetherill could find them later on. There was water and fair grazing. My two horses, "Carrie Nation" and "General Lee," were among them. Our supplies were by now greatly depleted, thus making our packs lighter and less numerous.

Substitutes

My mount thereafter was Johnson's mule, "Red." It was a good animal, as fast as any of our horses, and absolutely reliable. I wore but one spur, and this it obeyed as it would two. (We had lost some of our spurs, so one per person had to answer.) On a journey such as this one must learn to dispense with many things otherwise considered necessary, or else create substitutes. Using a Western metaphor, one must learn to cook ham and eggs without having either ham or eggs. Naming a few substitutes may be of interest: Johnson and his horse got into quicksand and in working himself out Johnson lacerated his shin. Blood-poisoning set in. We needed linseed for a poultice but substituted oatmeal. Another man had an injury which would not yield to city remedies such as I carried. Wetherill finally tried his hand. He applied a concoction of ordinary soap and sugar and the next day the patient was on the mend.

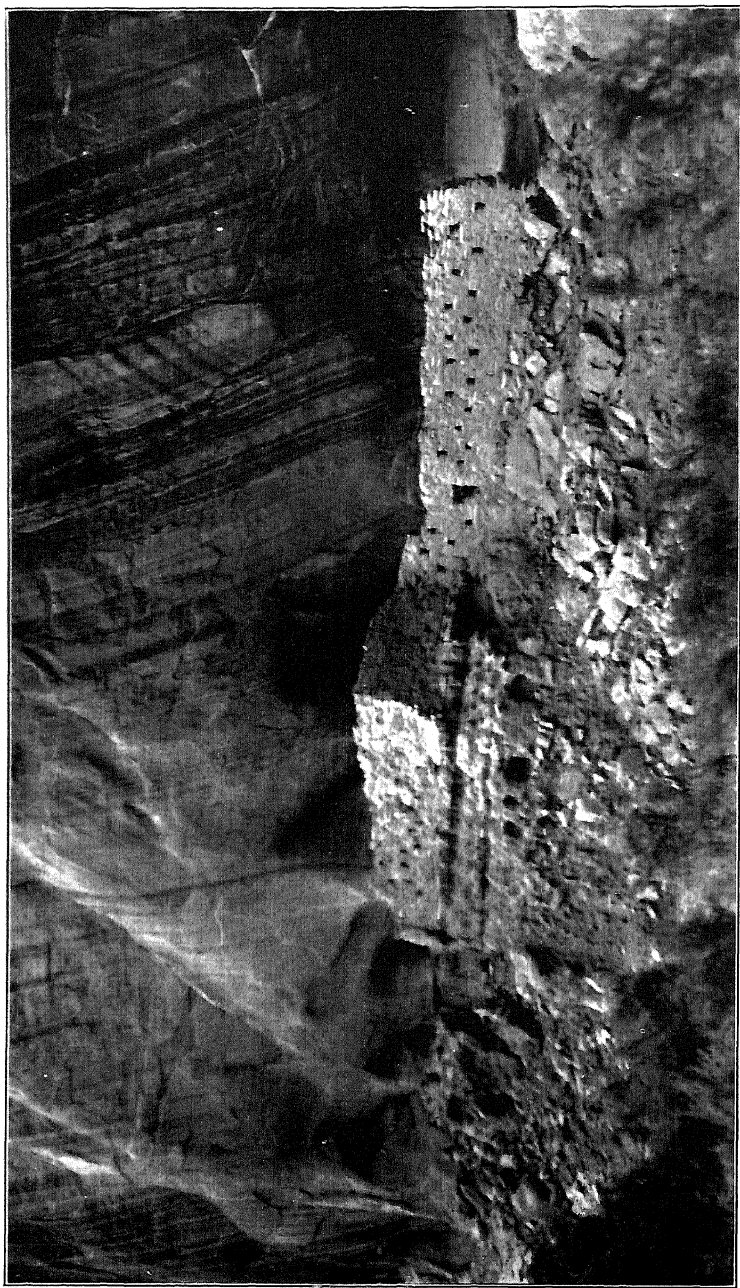
We carried no tents but, as on previous trips, made the tarpaulins which covered our packs answer in case

of rain. To mend my rubber air-mattress, which sprang leaks and deflated frequently, we successfully used chewing-gum while we had it, and then adhesive plaster re-inforced by pitch from the piñon tree. Wire and rope mended our broken pack-saddles. Iodine and Resinol salve served to cure abrasions on our animals. Brigham tea made an acceptable brew when our supply of coffee and ordinary tea ran short. A soup, concocted of kidney beans, canned corn, cheese, and Steero cubes, when topped off by some sardines, made an acceptable substitute for a solid meal. When the shutter of my Kodak refused to work, as I have previously said, time exposures in which a black stocking took its place, produced excellent results. The roots of the yucca weed served for soap, and when we ran short of strong sewing thread for mending shoes or a tear in riding breeches, my dental floss answered the purpose admirably. A humidor, for preventing my cigars from drying up and powdering, seemed necessary, so a sheet or two of newspaper soaked in water stuck into the cigar box both tightened its contents and kept it moist.

An illustration of how a serious injury and its possible consequences may be handled in an emergency with the means at command will not, I hope, be considered uninteresting. One of our Indians, wishing to ride a short distance to the place where our blasting was being done, saddled a mule. He did not use the tail strap nor take the precaution of tightening the



A typical winter home of the Navajo. It is called "hogan" and is constructed of cedar beams, branches, and adobe. It is circular, with an opening at the top in place of a chimney.



Promontory Cliff Ruin in Tse-a-Chong Canyon. A very unusual type of construction.

front strap holding the saddle in place, a measure always necessary, as mules are built wedge-shape, the front part of their bodies being narrower than their rear and their hair slippery. On a sharp decline the saddle slipped forward, throwing the Indian's weight on the mule's neck. The mule did what was expected of him: kicked and threw his rider. We brought the Indian back to camp with ankle and wrist badly swollen and a large black spot on the lower part of his back. We treated him with wet compresses and made him lie down. On our return to camp we found him sitting up completely covered with a messy sauce. In our absence he had crawled to a growing bush of the poisonous jimson-weed, dug it out, masticated it into pulp and then applied it to his sore spots. He was probably acquainted with the soothing effect of its belladonna content. He was filthy-looking. Some of the men washed him and treated him once more in white-man's way; but he refused to stay put in our absence. When we had to break camp and move on, his condition presented a serious problem. We had to take him with us either to Kayenta, a long trip, where he had joined us, or leave him with friends among the Navajo, then a long way off. On the day of our departure we strapped him with adhesive plaster and gave him a morphine tablet, of which I carried a supply for use in just such cases. Under the influence of the drug he felt relieved and stood the journey remarkably well. Next day we repeated the dose, and on the day

following the morphine buoyed him to such an extent that he deserted us, probably joining some of his friends where he could be treated by one of his own medicine men. We were not sorry. I have since heard that he is quite well again.

Camp Loafing

While at Painted Rock Camp in Cliff Canyon, Johnson's leg had to have a day's rest. It had refused to heal. To make him stay in camp I agreed to keep him company. In this I was perhaps a bit selfish, for I knew that camp loafing is no sacrifice, that it has a peculiar charm all its own, especially in surroundings such as we found in this spot.

(The Painted Rock ruins were but 600 feet from our camp) and there Johnson rested all afternoon in the shade while I explored every nook and corner of the ancient lair and for diversion watched the circular traps of the antlions, or the polliwogs and water-beetles in the rock pool.

Chips of petrified wood were in evidence everywhere. They have always been of the deepest interest to me. They told a mute story and I wondered if some day someone might not come who would tell those who are eager to learn the story of "A Petrified Wood Chip," reviewing its life among the primitive folk who called this spot home. Such an author would begin with the concrete object found by some 20th Century traveller, explain how it got there, the method used to fashion it,

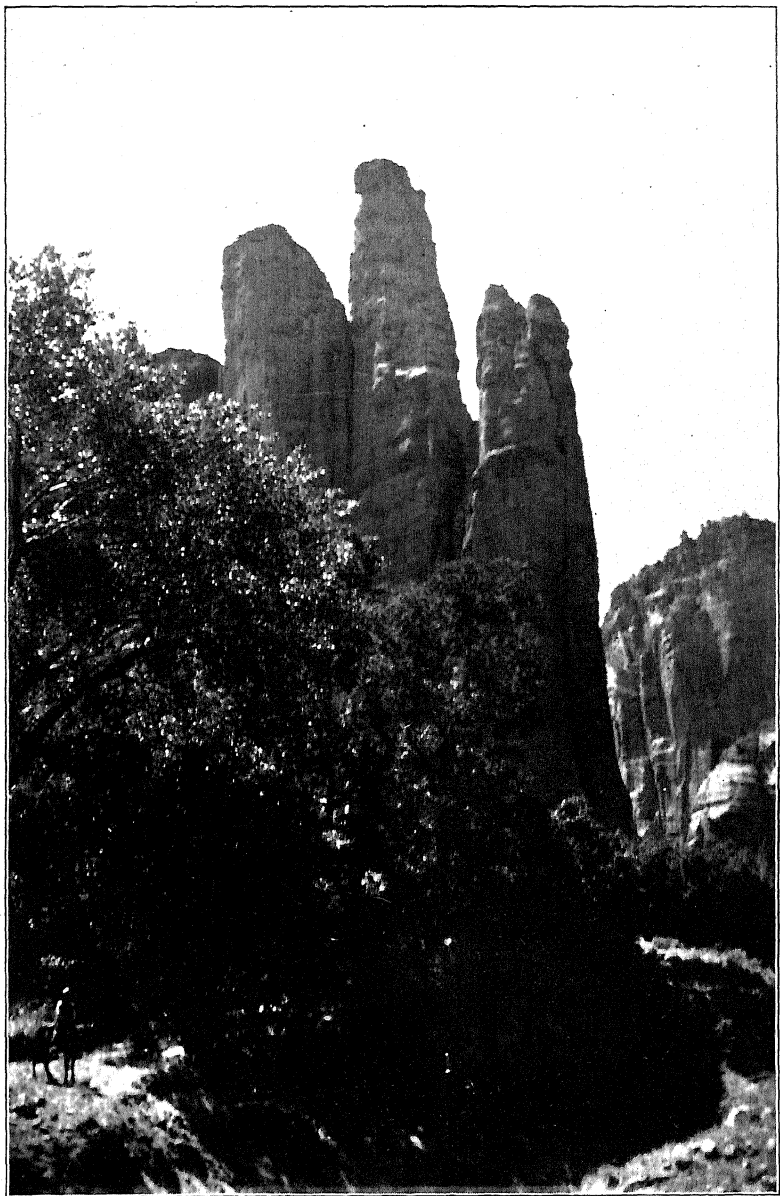
the why and wherefore. He would cover the whole field of present-day explorations as well as the conditions and surroundings of the users of the petrified object, now long gone; the reason for their employing sharp-edged stone instead of metal; their life, civilization, and disappearance. He would then go even further and show where this petrified wood originated; explain the geologic and cosmic changes which turned the ocean, covering a great part of the present United States, into an upland plateau, and paint an idyllic picture of a peaceful grove with its animals browsing in this Adamless and Eveless paradise. He would then describe a great flood, telling how it destroyed plant and animal life; he would picture a forest submerged by waters strongly impregnated with silicates, with iron, copper, silver, and manganese, which preserved the fallen trees until each atom of wood fibre had been replaced by an atom of mineral of the colour of the mineral salts present: red for iron, green for copper, black for silver, yellow for manganese, thus producing the magnificent colour effects now found in petrified wood.

In this connection I cannot refrain from relating how I was made fun of by one of the curators of the American Museum of Natural History in New York. I had spoken to him of finding a great deal of obsidian glass, a volcanic product, in Frijoles Canyon. I also told him that at Candelario's store, in the city of Sante Fé, I had seen arrowheads made by early man out of this glass. The curator, with great ceremony, pulled out

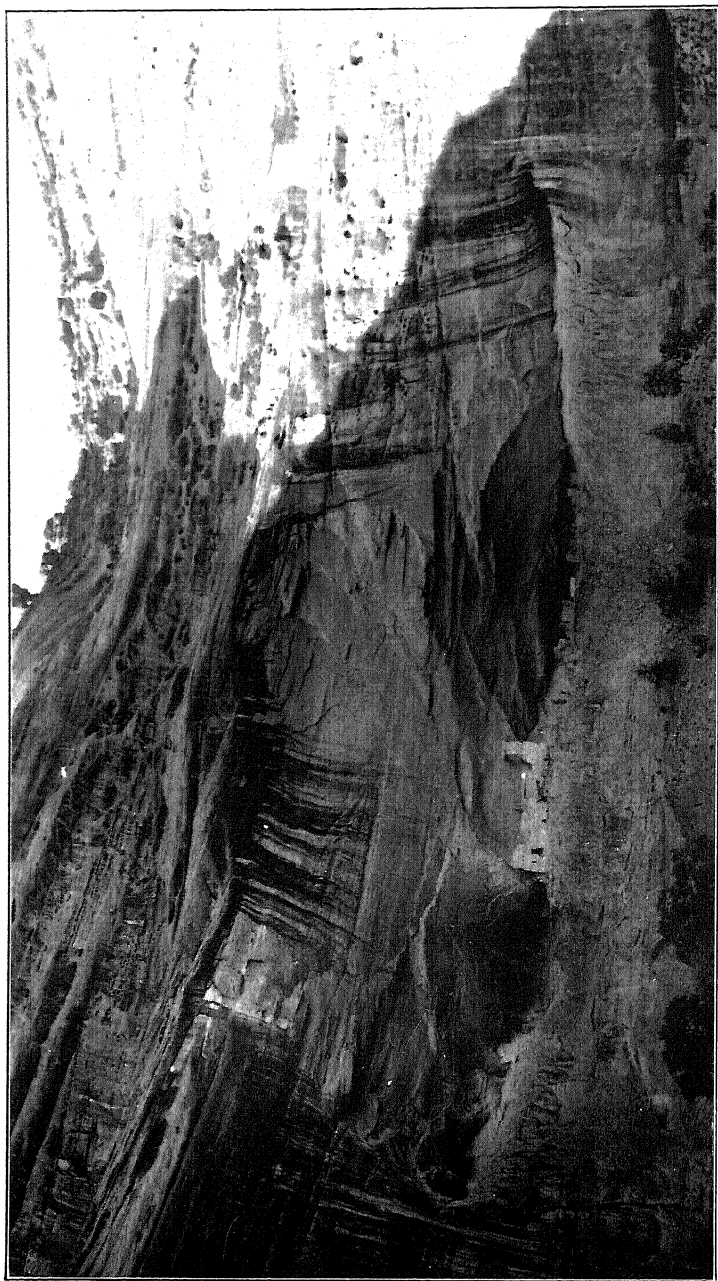
of his desk an arrowhead beautifully fashioned and as clear as crystal. My mind, still on the gray-green arrowheads made of volcanic glass, was dazzled by the unusual specimen before me. Suddenly he said, "I made this arrowhead myself," and to prove his dexterity he began to work on a piece of thick plateglass with a fine chisel. He chipped off tiny particles without much effort, holding the plateglass within a strip of leather to prevent injury to his hands.

Exploration of Lower Forbidding Canyon

After our cavalcade reached the Rainbow Bridge we divided—Johnson, Al Smith, and I with the horses and mules, returned over our new Red Bud Pass to Painted Rock Camp, preferring this to a trip of nine or ten miles through deep sand and unknown conditions, which Wetherill, Morris, and Jess decided to undertake afoot. Their intention was to travel downstream through Bridge Canyon to the point where it joins Forbidding Canyon, and travel by way of Forbidding Canyon as far as they could go. Johnson, Al, and I in the afternoon rode and walked down Cliff Canyon and Forbidding Canyon with some food to a point which we called "Charcoal Cave." That evening, on the very spot where Johnson and I, on our earlier trip, determined that we could go no farther, we met the pedestrians coming up Forbidding Canyon, fagged out and hungry. Our meeting-place was at the same cleft in the rock which had made Johnson and myself



A side canyon in the upper reaches of Canyon del Muerto. Note the luxurious growth of cottonwood trees. Animals will browse on its dry foliage, disdaining it while green.



Mummy Cave in Canyon del Muerto. Some of our most extraordinary finds of prehistoric remains, probably twenty-five hundred or more years old, were made at the base of the rock on the right-hand side of the picture.]

decide that trail building was impossible here. On hand and foot, however, it was not a serious matter to climb up and down. Our little party was once more united. We had now succeeded in getting a clear picture of the Canyon, geographically and topographically, lacking only the few miles between our Clematis Camp of 1922 and the spot where Cliff Canyon and Forbidding Canyon meet. Chance plays curious pranks. When Johnson and I got as far as Charcoal Cave near the cleft, at the bottom of which Forbidding Canyon Brook had its course, we noticed a tree trunk on the far side, jammed in by rocks so that freshets could not carry it away. In the dim past, no doubt, it was placed there by an Indian to aid him in climbing the wall. Strange as it may seem, in this large and wide expanse, it was this very cleft which years before had deterred Wetherill from going on when he was working his way upstream. As proof he pointed to his initials, "J.W.", he had then carved into a rock slab within twenty feet of the tree trunk.)

Mosquitoes troubled us off and on, but until we reached Cliff Canyon we considered them merely a harmless annoyance. At Painted Rock I was troubled by a peculiar swelling of my wrists; deerflies and ants were accused. In desperation I requisitioned the mosquito netting which I had carried with me for four years but never opened. Immediately after bringing it into use the trouble ceased. I therefore strongly urge that any one contemplating a trip on the Rainbow

trail, via Cliff Canyon, include in his outfit a supply of mosquito netting, not necessarily the kind made up on frames. My own was not that. I merely had a few yards of ordinary netting, which with the help of safety pins when strung over a rope make an acceptable substitute.

To increase our knowledge of the country, Wetherill, Johnson, and I, on July 6th, again attacked Forbidding Canyon, in an attempt to ascertain the difficulties to be overcome between Cliff Canyon and Clematis Camp where we were stopped the year before. We had not gone more than half a mile when we were convinced that without rope and hammers we should not be able to get further, even on foot. In one place we had to be let down by ropes and we realized that this kind of climbing would have to be repeated. Quicksands added to our difficulties. We found an immense cave, its floor covered with bits of charcoal, showing that it had been used for shelter by many generations. By merely scratching the surface we uncovered half a dozen sandals, some twine, and a long stick; the latter looked as though it might have been part of a bow. There were but few potsherds and petrified wood chips. The heat was intense. A storm seemed to be brewing and we hastened back to camp, as our position would have been precarious had a cloudburst flooded the canyon. There was no way of travelling on high ground to escape rushing waters.

Not more than 400 feet from our camp was a wonder-

ful rock-pool with running water, blue in colour, clear as glass. It was not deep enough for a swim but had water enough for a man to kick about in. I wonder what the tadpoles and waterbugs thought of our intrusion and hydrotechnics! The warm sand and the hot rocks on which we sat to dress, after making sure that our clothes did not harbour spiders or scorpions, offered a most agreeable contrast to the chilling whirlwinds which, every few minutes, swept through the canyon in the sunset hour. These whirlwinds, so common here, are a mixture of good and evil. They come and go suddenly, moaning and whistling while they last. They are welcome because they change and cool the sunbaked atmosphere; they are a nuisance on account of the sandblasts and the gritty additions which they hurl into cereals, jams, and other food.

Our baths here were never complete without some washing of clothes, towels, and other accessories, but, in spite of vigorous rubbing, our white things became more and more the colour of champagne. But we knew they were clean and the sunbaths gave them an antiseptic touch.

Charcoal Cave

Morris returned to camp shortly after we did. Having been attracted to Charcoal Cave and its archæological possibilities, he was overjoyed to discover that it might have been a home of the ancient Basket-Makers. He

found the skeleton of a boy stretched over 299 detached hematite beads, which had undoubtedly been his necklace. A number of arrow and spear heads, made out of petrified wood, and a ball of iron ore may have been his playthings and weapons. There was also a heavy oaken stick, later used as a fire poker, which might have been a discarded spear thrower, called *atlatl*. A large basket, lined with pitch, covered the skeleton. The skull was not flattened in the back. This convinced Morris that Charcoal Cave was the home of those ancient Basket-Makers, who existed long before the men skilled in the art of pottery-making. These latter carried their young on baby-boards, a contrivance which pressed on and flattened the child's skull; the Basket-Makers did not use such boards.

Morris scratched up a great number of sandals made out of yucca fibre, some of an exceedingly fine and intricate weave.

There are four other prehistoric sites within a radius of a mile from our "Painted Rock Camp," all worthy of systematic excavation.

The late afternoon was devoted to horseshoeing, and in the evening we matured plans for climbing No Name Mesa, now directly south of us.

No Name Mesa

When climbing around Navajo Mountain in years gone by, Wetherill thought he had noticed ancient steps cut into a rock wall of what we now call No

Name Mesa, indicating that at one time there had been habitations on the summit. He was anxious to visit them. The word "steps" does not signify steps in the accepted sense of the word; indeed, these steps are invisible to the untrained eye; only expert climbers note the slight indentations on an otherwise inaccessible rock surface. Wetherill had seen in some places hard stone, inserted in crevices where Nature was not likely to have wedged them. These were some of the signs on which he based his theory that the top of No Name Mesa had been inhabited at one time. They formed a keen incentive for giving up two days to exploring the summit.

At 8 A. M. on July 7th, we started out with water bags, hand picks, and ropes. Half an hour later we reached a ledge which Wetherill climbed, cutting little dents in the rock as he went up. Morris followed and I came on, held by a rope. Halfway up, however, my strength and wind gave out. Thus ended this particular effort on my part. Wetherill and Morris went on, while Johnson and I tried another direction, hoping to find a place more easily accessible. We climbed from one baldhead to another, finally landing on one which had a capstone resembling a revolving machine-gun; we went no farther. While resting there in the shade we noted a deep gash to the west and decided that this would probably be a better route than the one Morris and Wetherill had chosen. The advantage of a general panoramic view convinced us then and there

that before any reconnoitring is undertaken a panoramic survey should be made. We returned to camp, as did Wetherill and Morris. They, too, had failed to make any headway. They had been baulked by impassable ledges. Johnson told Wetherill of the cleft we had seen in the rock and suggested using the rest of the afternoon to ascertain its possibilities. We all started out and within an hour landed in a dark pocket, between two red walls which almost closed on top of us. At the farther end, however, there was a narrow split jammed with big rocks. We were convinced that this was the cleft we had seen from the top of the baldheads in the morning. On this theory we began to look for a way through. We dislodged one of the jammed rocks, crawled through, one man lifting the other man up; Morris was first to go through and Wetherill followed. The method was similar to the squirming one associates with snakes when they crawl into a small hole. For two and a half hours Wetherill and Morris left Johnson and myself wondering where they had gone. Because of their long absence we were convinced that they had found a way up and decided that "Johnson's Hole" would be a proper name for the spot. Into the rock on the right-hand side I carved "American Museum of Natural History, New York, 1922 Expedition."

Wetherill and Morris returned, a sorry-looking pair, clothes torn and hands bruised. They had failed in their attempt. They reported that the same type of wedged-in obstacles which we had met with earlier had

again balked them. That night at supper, however, it was decided that we would devote the entire next day to No Name Mesa, for both Wetherill and Morris were satisfied that the top could be reached by way of "Johnson's Hole." Wetherill was obsessed with the idea that it was well worth while. He believed that the permanent homes of the population which had inhabited these parts at one time were to be found on top of the Mesa and that the homes we had discovered in the bottom of the canyon were but the temporary sites occupied for the protection of water and the growing crops.

On July 8th, Wetherill, Morris, and Jess started up No Name Mesa via Johnson's Hole. It was seven o'clock that night when they returned, played out, with blood-stained faces and hands, their garments unrecognizable.

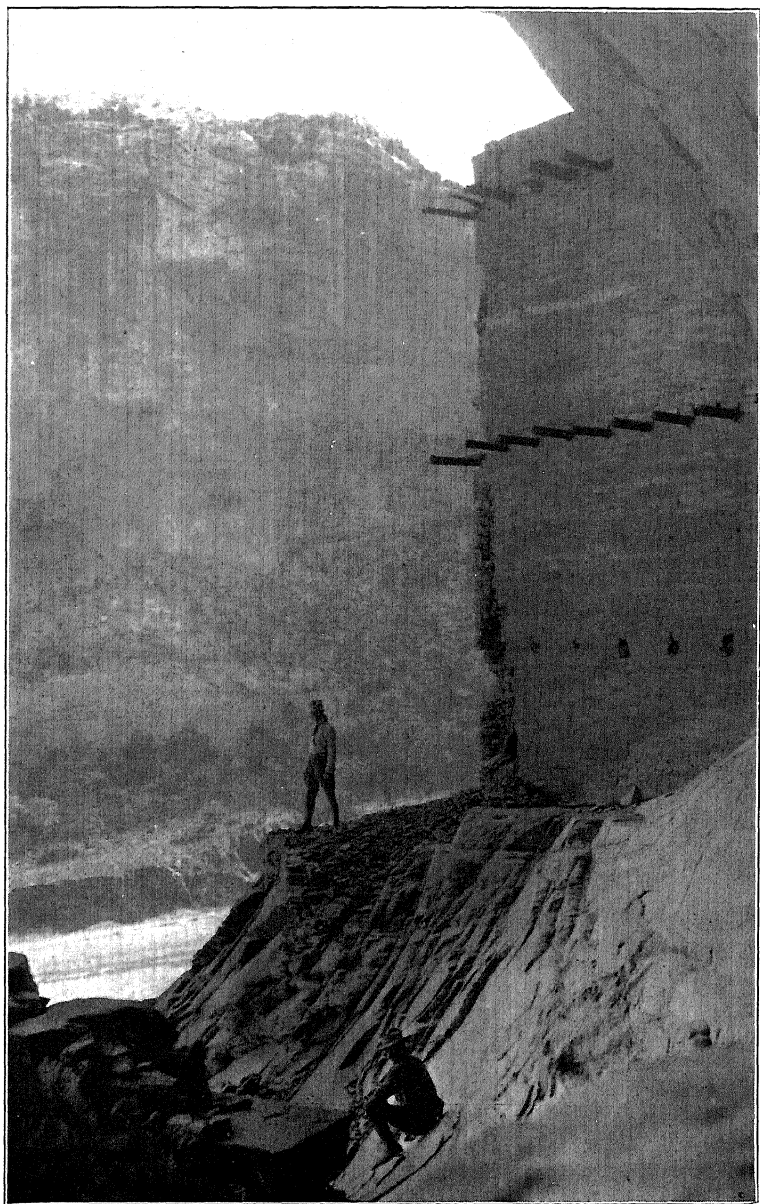
There were countless awkward holes in the chimney-like cleft which they had had to squeeze through, besides dodging falling rocks, sliding fifty feet at times down steep and slanting grooves where foothold was impossible. Without a drop of water from 8 A.M. until 7 P.M., no food except a box of seedless raisins, they had finally reached the top of No Name Mesa only to be disappointed. They found no trace of man, prehistoric, historic, or contemporary, ever having been there. There was nothing but the suggestion of an ancient cairn. There were no potsherds, no arrow chips, no traces of mountain sheep, nothing but sand

and rock, on an expanse three miles long and a half mile wide, flat except for a valley running through the middle of it. This was all these tireless men had to show for their day's work. But as Wetherill would never have rested content until this investigation was made, and might at some time have attempted the exploration single-handed—a most dangerous enterprise—we felt no regret in having devoted these two days to our investigation.

Johnson, Al Smith, and I had explored a cave in Forbidding Canyon while the others went up No Name Mesa. We named it Sandal Cave because of the large number of sandals we uncovered. Swarms of wasps were incessantly circling round us and in the end forced us to discontinue further work.

Homeward in 1922

On July 9th we began our homeward journey from Painted Rock Camp. We were up and about at 5.15 A.M. but it was all of 11.45 A.M. when we started. The rounding up of our animals took unusually long. The loading and reloading, because of their weakened condition, and the blacksmith work in addition, seemed to proceed more slowly than ever. The animals, standing for hours after being packed, became restless, would lie down, roll, and displace their packs, making readjustment necessary. All along I had been apprehensive lest our packs could not squeeze through the narrower parts of Red Bud Pass. I knew it would



Close view of the central tower of Mummy Cave. Note the masonry which is as neatly done as though it were a cabinet maker's job.



Travel in Canyon del Muerto is not all smooth sailing.

mean a delay of hours if the loads had to be taken off, carried through the narrow opening and repacked, on the other side, and this operation repeated a half mile farther on. The unexpected happened, however. The animals squeezed through; their emaciated condition helped them. The most awkward and dangerous places on both sides of the divide in Red Bud Pass were passed with considerably less trouble than had been anticipated. Here again was conclusive proof that animals behave best when necessity compels them to concentrate on the immediate danger before them.

Nasja Creek

We travelled through the familiar scenery in Bridge Canyon and crossed into Surprise Valley, where we stopped for the night. A frightful gale was blowing in the morning. There was no cooked breakfast. We dared not make a fire. Wetherill, Johnson, Morris, and I devoted the day to exploring Nasja Creek, the little streamlet which drains Surprise Valley and which we supposed emptied into the San Juan River about ten miles north. We travelled some three miles on horseback, over a dry brook-bed covered with rolling stones and boulders. This to my way of thinking is the hardest of all travelling on horseback. The constant danger of an animal spraining or even breaking a leg creates in the rider an extreme nervous tension. After tying up our animals we continued on foot, climbing over boulders that had now assumed the

proportions of barriers. The canyon had merged into a narrow defile, but a few feet wide, between walls 400 to 600 feet high, dark and uncanny even at the noon hour. A strip of the blue sky overhead, and sun spots on the rim of the walls, accentuated the cellar-like depths. Presently we came into a more open space but boulders closed up the defile as effectively as a cork closes a bottle.

One big boulder and two smaller ones wedged into a solid mass stopped all progress. We hammered and worked until one of them could be moved, and then we spied, deep down, a dark river, or lake, or water pool. A shoulder in the rock below prevented our estimating its extent. We lowered Wetherill by a rope. After some delay our leader, planted on a ledge, demanded a boat or to be pulled up. We lowered him a Kodak for a picture and then pulled him out. Thus, only a few miles from our base, ended an exploration, fortunately not a complete loss because it had been so intensely interesting. Some scouting from the rim of the Canyon, proper equipment, and a week's time would make the exploration of the entire length of Nasja Creek a valuable, intensely interesting venture.

On our return journey to camp we examined two cliff-ruin sites, but found only corrugated pottery chips. Rock falls had destroyed both home-sites to such an extent that little of value could be uncovered. At four-thirty that afternoon restlessness got the upper hand and we decided to explore the escarpment of

Navajo Mountain just south of us. We climbed steadily for almost two hours over dry river-beds and rolling talus and examined on the way every cave having a southerly exposure. Water seepage, however, had destroyed all that human hands had once constructed. In the deepest recess of one of the caves ancient walls still clung like swallows' nests, and in the uppermost cave that we reached Morris found a beautifully decorated water jar, of the three-colour type, in perfect condition. He took it along.

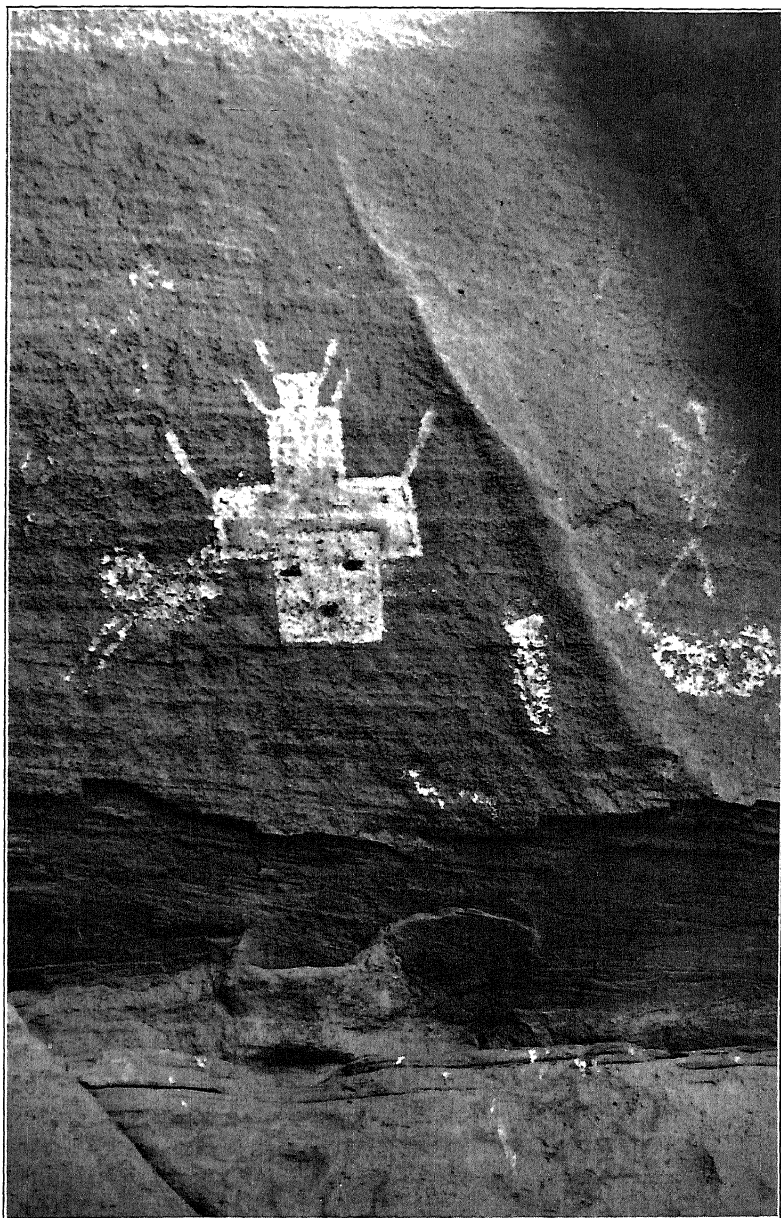
My two horses, "Carrie Nation" and "General Lee," were both out of commission. The grippe had weakened them, as it did the other animals of our outfit, so that all they could do now was to travel alongside our caravan. The condition of our animals had become a matter of grave concern. Their hoofs, particularly those of horses, gave trouble. In many instances a nail driven in would come too close to the tender part of the foot, and if it did not entirely incapacitate him would at least cause irritation and lameness. I continued to ride "Red," the trusty mule, and a better animal no one could wish for. He was so sure-footed and dependable that when crossing the dreaded Baldheads, between Surprise Valley and Beaver Creek, I had to dismount but twice. With a horse I should have been on foot most of the time. This being my fifth crossing of the Baldheads I may have had the contempt which comes with familiarity. A battleship fleet is only as fast as its slowest unit. Our movements were as fast as those

of our weakened animals. We left the most disabled and sick to their own devices at Beaver Creek, a procedure perfectly safe out here where none but a confirmed rascal would dare to steal an animal, while one in poor condition was doubly safe.

Cha Brook

On the afternoon of the 11th, Wetherill, Johnson, and myself followed the course of Cha Brook as far toward its source as we could. Morris followed the brook downstream, both parties bent on hunting for cliff ruins. Neither of us found any. There were many caves, but none showed traces of occupancy. Our stroll, though fatiguing, was keenly interesting.

A few daring climbs over knife-edge cliffs, foolish because unnecessary, left their impress on this excursion. One is readily tempted to become venturesome at the tail end of a journey and to throw caution to the winds because of the hardening of the mental and physical fibres in the school of experience. Those venturing upon trips such as ours should always bear in mind the words of the explorer Stefansson, and endorsed by other modern explorers, that adventures, or rather, risks, are marks of incompetence. Each year the trail to the Rainbow Bridge shows an improvement, and for this credit is due to Wetherill. The dozens of times I have been compelled to dismount and lead my horse on the earlier trips have dwindled down to very few. I do not hesitate to say that almost any one



Very ancient pictographs. They were probably made by the Basket Makers.



Pictographs in Canyon del Muerto, near a grave in which we found a well preserved flute. The drawings and the flute would indicate that a flute-playing clan inhabited these parts.

in fair health could now make the trip to the Rainbow Bridge. By proper preparation the necessary hardships can be reduced. A few men, with tanks of water on mules, can go ahead and prepare camp, thus making camp sites independent of the natural water resources, and permitting the daily journey to be regulated by the wish and capacity of the travellers. The normal time required each way is from four to five days. If changed to six or seven days it would reduce the daily journey to about fifteen miles, not too much for any one, after the first two days' travel. Those who want tents and sleeping bags should take them along. I have always been glad to do without them. The most trying stretch, so far as the matter of water is concerned, is that between Beaver Creek and Sagi Canyon. The regular trail presents nothing unusually difficult in the way of rough places, but the distances are great and there is a degree of monotony which might be irksome to some. To me there is always something interesting even there, whether it be types of vegetation or rock conformation; even the sage flats are lovable in their apparent uniformity.)

The Law of the Desert

The bleached bones of a horse which we passed on the road recalled an incident which occurred on my trip of 1920. In the morning we had left camp with ten horses; before noon we had eleven, one of them a youngster. The addition did not come about in the

usual way. Al Smith and I were lagging some distance behind our leader, Wetherill. Al asked me whether I smelled anything unusual. Of course, my town-bred nose, accustomed to and blunted by city odours, did not. Suddenly Wetherill stopped and turned his chin up into the air, a way he has instead of pointing with his arm. Lying on its side, just off our trail, was the dead body of a white mare, and not many paces from it stood a tiny colt, more curious perhaps than frightened. The mare's entrails had been eaten by coyotes; otherwise she was intact. A close examination of the scant vegetation showed that the colt was not old enough to nibble at grass, that it was still dependent on its mother's milk and was, therefore, but a few weeks old, possibly four or six. The condition of the body indicated that the mare had met her death the day before, possibly by a misstep and a fall which broke her neck. We concluded that a mother coyote with a hungry litter of young ones had feasted on the dead mare, for had a pack of coyotes been there they would have done some fighting and tearing, none of which was in evidence. The cunning coyote may have reasoned that the colt would be an easy prey when she was ready for it, thus sparing it for the time being.

My first words after taking in the situation were, "We must save the colt."

There was no reply.

"If the colt is too young to travel I am willing to pack him on my saddle," was my second remark.

Then Wetherill answered, "We will see."

Not the monosyllabic words, but the tone in which he spoke, was unusual. I had never seen him in that mood before.

"Are we not going to save the little one from the pack of coyotes, from the horrors of the night?"

Again he answered, "We will see."

I was astounded. I didn't like the turn things had taken and it began to dawn on me that I was facing something new in my experience.

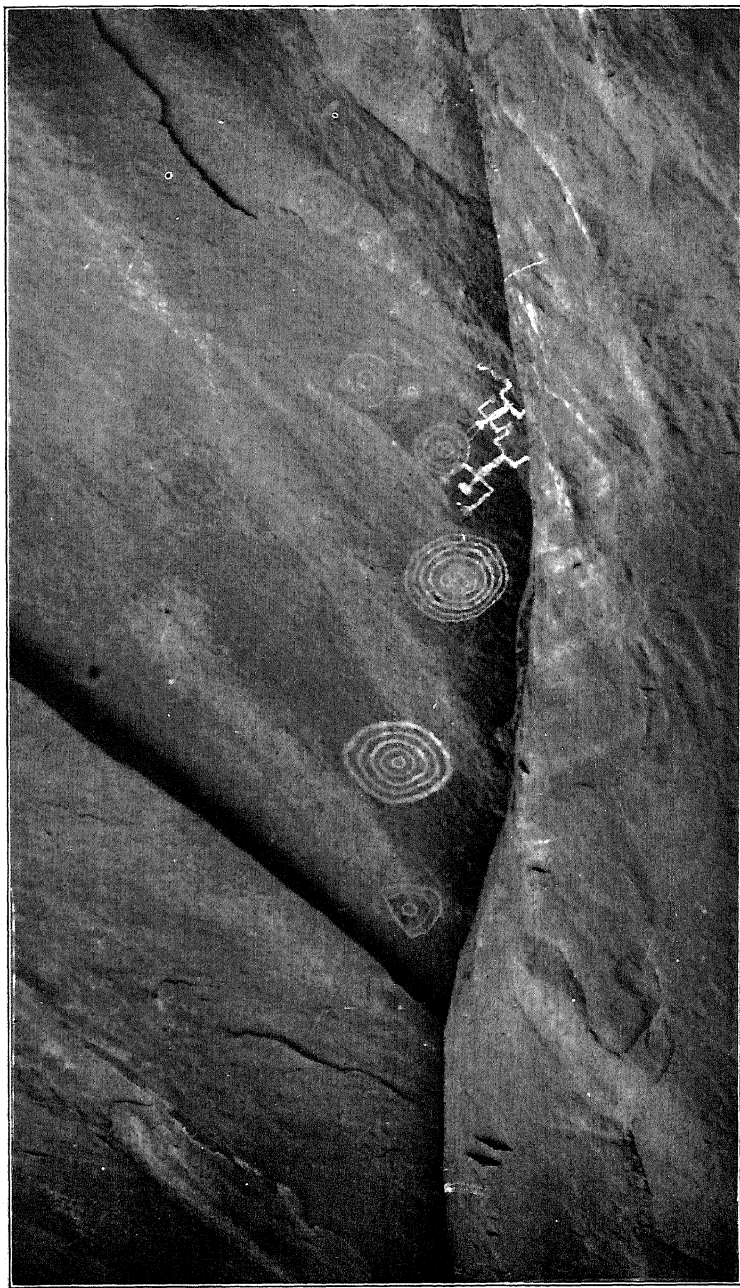
Suddenly Wetherill gave his horse the spur. It started and the poor little starving colt galloped after him. It mistook Wetherill's horse for its mother—both were white. Wetherill had worked out his problem with lightning rapidity, while examining the situation. We moved farther; so did the colt. We now knew it would and could follow, for it hoped once more to get mother's care and food. The something new which I now began to grasp was the unwritten law of the desert. To have taken the colt on my saddle would have been the equivalent of horse stealing, punishable by ruthless reprisals. Our only alternative, had the colt been unable to follow, would have been to catch it and give it a quick death.

Wetherill rode in the lead and was closely followed by the colt. I rode behind it and had my hands full keeping the curious horses of our packtrain from annoying the little fellow. My heart went out to the weak stranger, especially when it would run up to

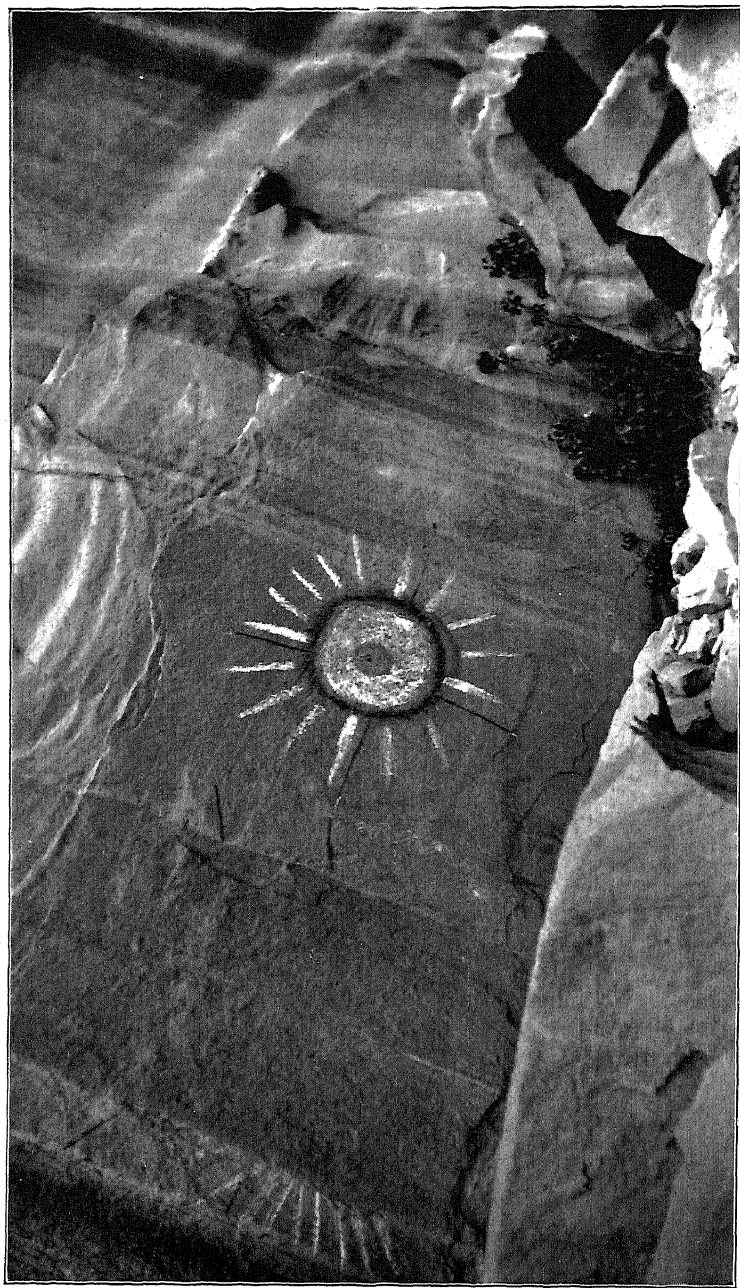
Wetherill's horse to get mother's milk, only to be met with a kick. Wetherill planned to take the poor, thirsty, hungry creature to a hollow about three miles away which usually had some water. When we reached the spot we found blackish mud indicating moisture below. We dug a deep hole and the unwholesome liquid scooped out into Al Smith's hat had to be forced down the poor colt's throat. To do this we pushed his nose into the liquid and held it until he either drank or suffocated. He drank a draught which was probably his first direct acquaintance with water.

It was seven miles farther to the nearest Navajo camp, which was our objective, but the colt stood the journey. He certainly showed the vitality of a denizen of the wild. There were two hogans. The women, with their little ones strapped to baby-boards, were shearing sheep and goats corralled in a stockade near by. Two men were doing nothing in particular. An almost endless talk finally concluded, the colt was caught and taken into the stockade.

The negotiations had resulted in an informal treaty or understanding. The Navajos were to accept the colt, whose ownership we did not know, but which of its own free will had followed us, as a gift—so far as it was in our power to give what we had not acquired—to one of the papooses on the baby-boards. They were to give it sheep and goats' milk freely and keep and care for it as their own; but if some Piute Indian were to come and claim it they were then to give it up.



Pictographs found in Canyon del Muerto. Some of the drawings are very ancient, others quite modern.



Sundials, in various shapes, are frequently found.

The consideration which we paid them for the care and risk of losing the animal was \$2.

Zane Grey Canyon

On July 12, 1922, we arose at five. Our packs were ready at 8.45 A.M. for the crossing of the long waterless and feedless plateau east and south of Navajo Mountain. At noon we stopped fifteen minutes for a dry lunch. Canned Del Monte pears and tomatoes served to quench our thirst. Our animals had to get along without water and on the most meagre kind of browsing. We were aiming for a tributary of big Piute Canyon, where Wetherill hoped to find water for the night. A ragged, zig-zagging Indian-made trail, horribly steep and covered with protruding roots and deep holes, very nearly led to disaster, but eventually we made the place. The thirsty animals put on speed where the utmost caution was necessary and crowded against each other, impatient to get to the water. They seemed instinctively to feel that somewhere, downward, water was to be had. But they were a sad and disappointed lot of brutes when our goal was reached only to find there was no water there. The prevailing drought had dried up the pools. Snorting and sniffing, their nostrils distended, they rubbed their noses against the cool, damp cracks in the deep recesses of the cave at the end of the canyon. From shelf to shelf they ascended and descended, circling round, hopelessly despondent, the packs still on the backs of most of them.

After picking out a likely place, all hands plied shovels, digging a deep trench. Four feet down water began to ooze, and after an hour's hard labour we were able to let the animals quench their thirst, a few at a time. Some would not enter the trench and had to be driven in with hard blows after the sensible ones had finished. Others could be made to leave the trough only after punishment. Fortunately for the men of the party, we discovered what was probably the most modest little spring in existence; a few drops of water at a time rolling over a stone and losing themselves in the sand a few inches away. We built a reservoir, and after long waiting at last had some water—not much, I admit, but it was clear and it was wet.

A stroll before supper proved very interesting. The canyon was far from small and, although dry, it showed by its varied and profuse vegetation that in normal years it was well watered. Even now I found a number of places where digging would furnish an ample supply of water. Birds were everywhere in evidence, doves, bluebirds, and robins. Broadleaf and splitleaf willows promised feed for our animals. The cave at the head of the canyon was of perfect spherical symmetry with shelves running in several tiers all around it. Every sort of name was suggested for the canyon: Dry Canyon, Breakneck Canyon, Willow Canyon, but none met with unanimous approval until Wetherill told us that he had visited the canyon ten years before with Zane Grey. We voted unan-

imously that Zane Grey Canyon should remain its name.

A trail made by Indians leads down Piute Canyon and connects with the upper crossing of it which we had taken two years earlier.

Man's perversity follows him even to the desert. Our spring water supply was short and my thirst that evening was unquenchable. No amount of water seemed to satisfy it. There was the trough, the long trench of murky liquid in which our animals had steeped themselves. The ooze had settled. Johnson did not drink coffee. He carried Postum for his own use. I begged for some and at last had my fill of liquid consisting of Postum boiled in the trench sauce. Colour and taste disguised dimmed the memory of the actual and finally, in the absence of anything better, satisfied me.

Next day we spent eight hours on the march. We did not stop for lunch. Our trail crossed the plateau between the headwaters of Navajo and Piute canyons, and finally dropped into Sagi Canyon, where we camped the night of July 13th to 14th. The water there, while abundant, was of a poor quality. Food for our animals was plentiful. There was no grass, nor were there willows or oaks. Russian thistles, low spiky plants, were the only things growing in the neighbourhood. Fortunately they were young and comparatively tender and in the absence of anything more palatable were accepted by the horses as well as the mules. From past experience we were thoroughly acquainted

with the streamlet in Sagi Canyon. Its colour is that of café-au-lait and it is sandy and alkali-flavoured. Boiling settles most of the sand, but the alkali remains. At least it is good for one's teeth. No need here for bicarbonate of soda or milk of magnesia.

With the exception of Johnson and Morris, all of us were now riding mules. These stood the hardships better than the horses. Red, my mule, had been very satisfactory. He was all I could wish for. There are just four things which one should be mindful of when riding a saddle mule. First, it must be saddle-broken; second, it must be kickless; third, the mule must do a minimum amount of shying at unexpected objects; and fourth, the saddle must be frequently adjusted in the day's ride, as it has a way of slipping if there is much travelling down-hill. I strongly recommend such mules in preference to horses; but I admit there are not many that fall within these specifications.

Keetseel

Al and Jess Smith made an early start for Kayenta with the pack animals on the 14th of July with orders to send an automobile from there, if one was available, to meet us in Marsh Pass, at the mouth of Sagi Canyon. The rest of us rode over to Keetseel ruins, a distance of about six miles which, with Betatakin and Inscription House, share the reputation of being the finest ruins in this part of the Southwest. Keetseel lies in a side canyon of Sagi Canyon. We reached Keetseel Canyon

by crossing a divide covered with a heavy growth of piñon pines and cedars of fantastic shapes, making an attractive picture.

The descent into Keetseel Canyon was very rough, the kind of descent where one ordinarily leads one's animal. But as Wetherill remained on his steed I followed suit. One feels so much more secure on the back of an animal than afoot because immediately after dismounting the muscles are stiff and lend themselves poorly to a perilous footing on sliding stone and sand over slanting rocks.

The Keetseel streamlet had cut a deep gash in the silt and rubble deposit which covers the canyon floor to a depth of not less than thirty or forty feet, much more in many places. Because of its constantly varying course there is no trail. Wetherill had to find a way down and across. He picked out a likely spot, leading his mule, and broke down the loose sand. I followed but a few paces when I slipped on a hidden slanting stone slab, as did my mule, which fortunately I had been leading on a loose halter. Nothing worse happened but it was a close call. If my mule had not caught himself with his hind legs he might have come down on top of me; but "All's well that ends well!"

The trail up Keetseel Canyon, after its easterly brink is scaled, is most delightful. It bends into little coves, one after the other, where through oak woods alternating with groves of tall yellow pines it is full of surprises; for here one finds wild roses, black currants;

gooseberries, clematis, hops, grapevines, ivy, milkweed, primroses, and asters hobnobbing with every variety of desert plant.

We reached the Keetseel ruins at noon: a fortress home without defenders, silent and frowning. The "Big Beam," twenty-four inches or more in diameter, was still there. Its thirty-foot broadside faces the valley. Wedged in between two houses it rests, as it was left by the ancient carpenters whose stone axes had neatly chopped off branches and ends. Its use remains a riddle. Its bulk, size, and location seem out of all keeping with the surroundings. We left after a stay of nearly two hours, following the Keetseel brooklet, first high above it and later in its streambed, annoyed considerably by quicksand, until we again reached Sagi Canyon. There we met Professor Samuel Guernsey of the Peabody Institute of Harvard University. He had been excavating with extraordinary success the burial cists here in search of Basket-Maker remains. The automobile from Kayenta was waiting for us at the appointed place in Marsh Pass. All of us crowded in, concluding in Kayenta, ten miles farther east, a memorable and successful expedition, having been preserved by the grace of God from all serious mishap. Four-legged beds and the civilization of which they are a part claimed their own.

The object of our expedition was in every way accomplished. Navajo Mountain had been encircled by a packtrain, a feat which had been considered

impossible. That rugged, forbidding giant rock, the War God's dwelling-place, had been circumnavigated, and a new way to Rainbow Natural Bridge, shorter by ten miles than the other way, had been found, thanks to the experience and energy of John Wetherill in trail-finding and to the able and indefatigable support given him by Zeke Johnson, Earl H. Morris, Al and Jess Smith. Many hundreds of square miles of new, unknown territory within continental United States had been opened, mapped, and made known to civilization.)

Medicines

I have often been criticized for carrying a large and varied assortment of medical supplies at considerable inconvenience to myself. The inconvenience, which is admitted, represents an insurance premium well worth paying if one stops to visualize the emergencies which may arise. Fortunately my complete outfit for handling rattlesnake bites was never required. The three doses of Brazilian serum, the hypodermic syringe, permanganate of potassium and strychnine have remained unopened from year to year.

But some of the simple remedies served us well and added greatly to comfort and safety. Ammonia is useful for scorpion, ant, spider, gnat, and mosquito bites. Iodine is good for wounds in general, on blistered heels and on legs and hands after cactus points have been cut out. It helped a mule that a tight rope had cut to the bone, and speeded the animal back to usefulness. Ad-

hesive plaster fastened the bandages of this same mule after a liberal use of mentholatum; it supported the injured back of our Indian; it mended my broken razor box and reënforced my pasteboard medicine cases, just about falling to pieces. It closed leaks in my rubber air mattress. Mentholatum and unguentine take care of man's and beast's abrasions and with lanoline afford protection from sunburn. Argyrol and boric acid ease irritated eyes. Horlick's malted milk tablets, Luden's cough drops, cascara, aspirin, and Musterole rapidly cured an acute bronchial cold. Kondon's jelly rendered immune those exposed to this bronchial cold, and also lubricated noses and throats after shrivelling sandstorms. Velogen relieved parched lips. Allen's Footease helped one of our men. Pond's Extract and talcum served for saddle soreness. Aristol helped in healing many a wound. Bicarbonate of soda and Jamaica ginger were frequently called into use in cases of indiscreet eating. For peroxide of hydrogen, Resinol salve, analgesic balm, vaseline, gauze, bandages and sterilized cotton, scalpel, scissors and tweezers we had frequent use. Even porous plaster was needed. Brovalol cured a lady of train sickness. Finally when a hobo, who had stolen a ride on the California Limited, was thrown, or fell, off the train east of Adamana, my medical supplies, including tourniquet, were the only ones available to support, temporarily, a broken leg and shoulder until the man could be transferred to an hospital in Albuquerque.



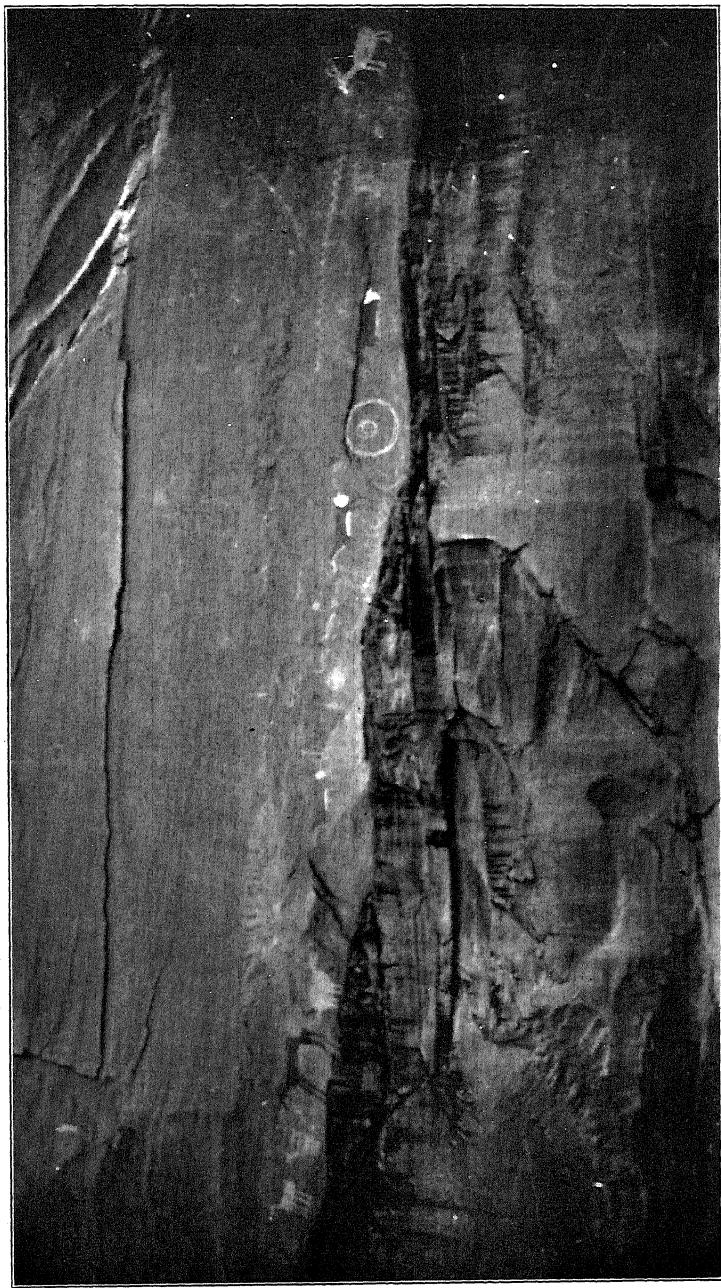
Pictographs found in upper Canyon del Muerto. The drawings of the square-shouldered men, the wild ducks, and mountain sheep are very ancient. The horse was chalked on by a present-day Navajo Indian.



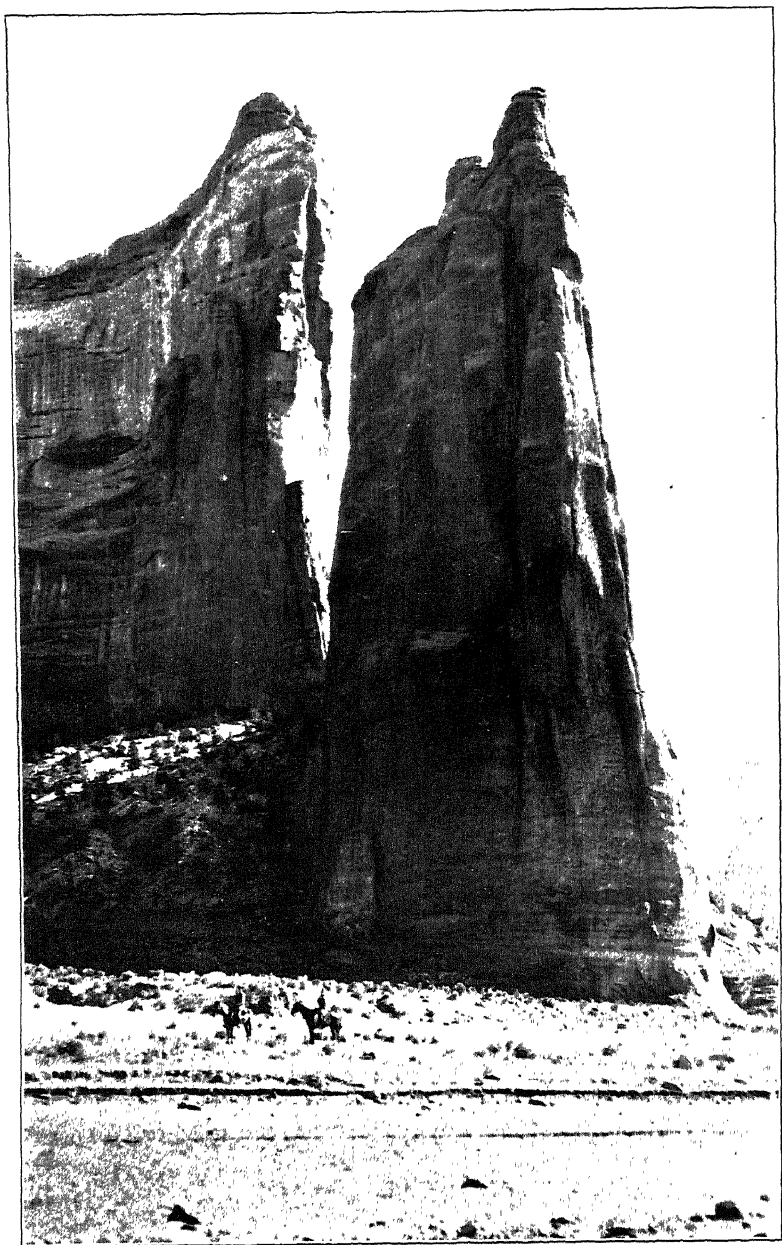
This drawing, found in Canyon del Muerto, is noteworthy in that it is of Spanish origin, representing priests and soldiers and is placed near many drawings and pictographs of native origin. It is not far from the spot where the Spaniards put many natives to death, from which event the Canyon got its name.

In taking leave of horse and mule, of canyon and springs, and of desert solitude, I would feel guilty of ingratitude if I did not revert to those inspiring moments when the break of day silently comes forth in its golden glory, when the mysterious spirits of the dark have faded into oblivion, when the barking of the coyotes has died away and the wing-draft of the bat flying close to the sleeper has become a memory. Rocks and sand then look hallowed and the air of the desert penetrates lungs and pores with a vigour of youth all its own. Every flower, every blade of grass glitters with the joy of living. Even that grouch of vegetation, the prickly cactus, while opening up its filmlike flower petals, smiles its ultra-violet smile and appears to make peace and good will its motto for the day. The spiky yucca, which earned the name of Spanish Bayonet, looks less warlike. It suggests plowshares instead of swords, and recalls the multiple uses to which it is put by the natives. That poisonous vegetable belladonna, the *Datura*, hospitably spreads its white, lavender-tipped lily cups to the toad that sits by its side, watching for the flies that its nectar entices. The *Mariposa* lily nods its unspeakably beautiful "top of the morning" and the modest sagebrush wafts its aromatic scent to enrich the morning air.

THE 1923 EXPEDITION



Drawings in three colours, white, black, and red, representing antelopes, to the left of Antelope Cave in Canyon del Muerto. The pictures of the mountain sheep are more ancient.



Scene in Canyon del Muerto.

are merely structures built over an older civilization of which traces appear here and there. One of the many Khivas, the largest ever uncovered, stands here. It is a circular council chamber, eighty feet in diameter, evidence of the regulated government presiding over the destinies of these ancient people. One room which Morris showed us deserves special mention. Doors and windows were closed by masonry but its contents were gruesome. Eight skeletons were apparently fused into an emulsion with corn and other eatables. Walls cannot talk, but the imagination may. It is possible that some uprising had taken place against the existing authorities, and that either the head men of the government were summarily incinerated, or that they themselves had thus punished those rebelling against their authority.

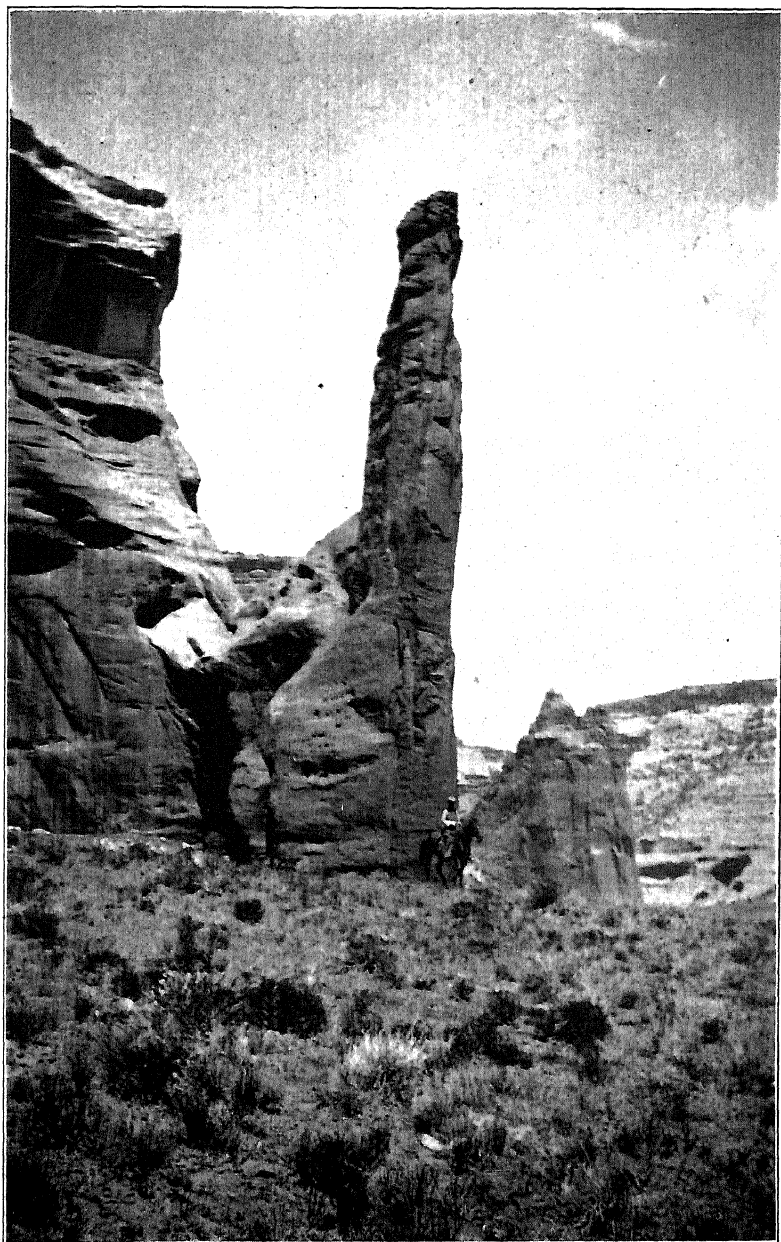
That night we stopped with Morris and his mother. The only grievance I had against my host was that he lodged me in unpleasantly close proximity to two skeletons and a large assortment of skulls. Their traditional midnight pranks did not take place, or if they did I slept too well to be disturbed by them. Hundreds of perfect pieces of pottery of all types and of quaintest forms, ready for shipment to the American Museum, revealed the art and industry of the American aborigines and vividly pictured the story of their development.

Shiprock

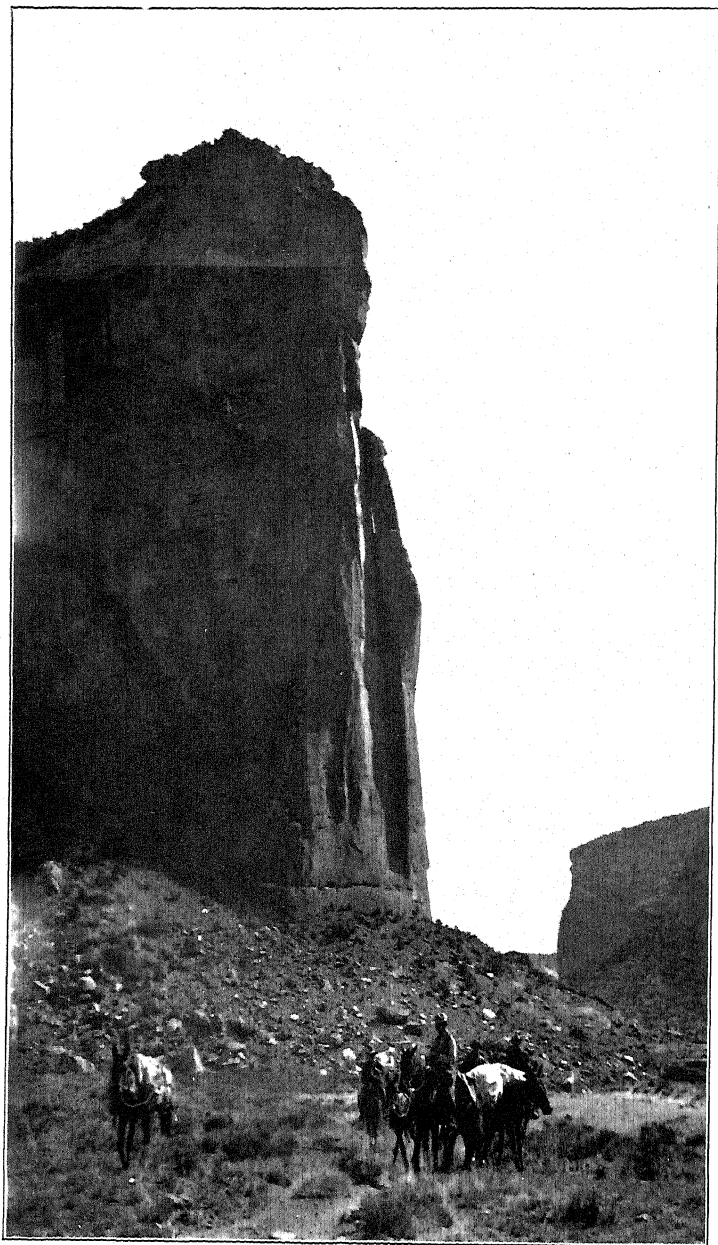
Next morning we left for Shiprock, forty miles south. It is a trading post and one of the most important Indian

agencies on the Navajo Reservation. Here irrigation has brought forth an oasis, and schools, playgrounds, and farms have been established for the training of Indian youths and grown-ups. It is a creditable monument to the genius who accomplished it. It is a discredit to the red tape which has displaced him.

Twelve miles south of the Shiprock Agency a mass of black rock rises sheer and bold. Visible for one hundred miles in all directions, it is the shape of a clipper ship, with all sails set hence the name "Shiprock." My failure on a previous journey to get near it determined me to reach it now. We were able to bring our little old Ford car to within two or three miles of it and were fortunate in more ways than one. The road leading to a trading post called "Red Rock," far to the south, though little used except by the natives, is not bad; then, too, we fell in with an Indian who let us use his blue-gray pony in photographic posing, for a consideration, and the light was perfect for photographing. Shiprock has never been scaled. It rises eighteen hundred feet above the floor of the desert and is undoubtedly the core of an ancient volcano, the conical slopes of which have been washed away. It is one of the most striking natural monuments in this part of the country. To the southeast of it is a similar, but less picturesque, volcanic remnant, called "Bennett's Peak." Agathla and Church Rock, near Kayenta, and Venus' Needle, about fifty miles north of Gallup, are of like nature; but there is only one Shiprock.



Scene in Canyon del Muerto.



Scene in Canyon del Muerto.

A mail route lies between Farmington, on a spur of the Denver & Rio Grande Railroad, and Gallup on the Sante Fé Railroad; it passes Shiprock, Newcomb's Store, and Tohachi. It will offer strong temptation to some future railroad builder for connecting these two railroad systems. The topographical difficulties are slight and the oil discoveries at Hogsback Dome, not so very far to the east, at Nokaito to the west, as well as those near Bennett's Peak may, if the United States Government and the Indian tribes occupying the land consent, be an added inducement.

Cemetery Ridge

Cemetery Ridge is a name Morris gave to an elevation just west of Newcomb's Store, about eighteen miles north of Tohachi. It is a low mesa, many miles long, but only a few hundred feet in width. Its top is literally covered with graves. The skeletons we uncovered were very near the surface. Let me describe a typical grave: while digging, if we come across a flat stone the presumption is that it covers a grave, and immediately the shovel is replaced by trowel or whiskbroom. The stone slab is carefully loosened and lifted out. A skeleton, if undisturbed by moisture, badgers, or rats, is usually in a crouching position, the legs drawn up close to the chest and the arms folded. The object, no doubt, was to have the body take up the smallest space in the ash or refuse piles, where they were most frequently deposited. Several

bowls and jugs were usually buried with the bodies. Those buried in Cemetery Ridge belonged to a period halfway between the earliest types of Pottery Makers and the highly developed types found in Inscription House.

The aborigines buried on Cemetery Ridge may have lived from fifteen hundred to two thousand years ago. This statement is, of course, a mere guess. No scale has yet been devised to determine the duration of the various eras; only their relative positions have thus far been established. A scientist is now at work examining the annual rings of the giant Sequoia trees, the oldest living things on earth, some of them three thousand years of age. His theory is to group the ring spaces, if large, as showing good growing weather, if small, years of drought and other adverse conditions—and then to compare these with the annual ring groups in the beams of the prehistoric cliff houses. His idea is excellent, but I believe he does not take into consideration that growing weather may have been favourable in the Sequoia districts of California during the same period that it was unfavourable in Arizona.

One grave was unusually interesting. It contained an extensive set of potter's tools: polished stones, odd-shaped polished potsherds, all used to form the tray, bowl, or jug, which the ancient potter intended to fashion. A cubical piece of hematite iron 2 x 1 x 1", polished on all sides, was undoubtedly used by him to produce the red design on his pottery. A number of

very deep blue turquoises completed our find in that particular sepulchre.

The following morning Wetherill arrived in his own car. All morning we dug with great success and early in the afternoon navigated our modern prairie schooners back to Shiprock to repair them and then proceed toward Carriso Mountain, one of the objects of our expedition this year. A stop for water at Tes-nas-bas, on the north slope of Carriso, delayed us but a few moments, and sundown saw us at a bleak, windy spot northwest of Carriso. We had to make camp. Morris's little Ford had weakened its spine. A cedar beam which we took from a deserted hogan and strapped under its frame with wire and rope prevented the car from falling to pieces. It was a good job, for the Ford was none the worse for the trip. Pale green flint, precisely the colour of jade, was in evidence everywhere. Morris told us that he had seen large pieces on the north slope of Carriso. The natives had undoubtedly used this stone for fashioning their arrowheads. The night was cold and dreary but we had water and that went a long way toward making us comfortable. Next morning found us at a lonely trading post called To-Thla-Kan, in charge of one of Wetherill's friends. He lived there with a charming little family, three of the finest young children I have ever met.

No one could give information about the canyons which we intended to penetrate. We were especially eager to know whether they held ruins about which

Morris had heard reports. We went to the home of the Rev. Mr. Hookum, ten miles off the main road, as we had heard of an Indian living near there who could direct us. He could not be found. Miss Hookum and Miss Baker, a trained nurse, two bright and fearless young women, gave us some directions, but they had never entered the region we wished to visit, nor did they know which of the several canyons on Carriso's westerly slope contained prehistoric remains. The Indians are generally reluctant to give away their knowledge, and such meagre reports as Morris had were drawn from native sources.

We proceeded to enter one of the larger canyons to find out for ourselves. The automobile carried us as far as it would go, which was not very far, for a rock ripped a six-inch hole in our oil tank and tore out two bolts. Our water bucket saved us by catching the precious motion-giving fluid. Rags plugged the hole temporarily. We went ahead on foot and did some trying climbing, but we were convinced that there was no chance of cliff ruins in this watershed and that the two canyons, called Chinlini and Seklagaidesa, on Gregory's map, with a junction farther upstream, were really one canyon with a delta-like channel where they reached the desert floor. A day was wasted and our automobile well-nigh wrecked. Late that afternoon and far into the night our two repair men, Wetherill and Morris, worked like Trojans on the battered car.

On May 29th our horses, in charge of Julian Edmon-

son, arrived from Kayenta and we started real explorations. The use of automobiles, even in conjunction with horses, has at no time appealed to me for this type of work. Horses and mules are more dependable.

Tse-a-Chong

We now tried to enter the canyon farther south. Tse-a-Chong is the name the Indians gave it, meaning "Ugly Rocks." To reach a spot far up its course required tedious cross-country riding. Fortunately we met an intelligent Navajo and for a few dollars he agreed to guide us. On the way we passed what is probably the most magnificent amphitheatre existing, a flat arena two miles in diameter, surrounded by a shelved rock bowl, the stratification of which recalled bleachers. At the two ends, like gateposts, stood crown-shaped mesas. The amphitheatre's proportions were gigantic, the Roman Coliseum but a pigmy compared to it. The layer-like formation of rocks in this vicinity reminded us of the taffeta skirts composed of rows of flounces worn in Queen Victoria's days.

Beyond the farthestmost of the crown-shaped mesas we entered Tse-a-Chong Canyon. Our horses were in poor condition when they arrived at To-Thla-Kan but they held out pretty well. We travelled up Tse-a-Chong perhaps fifteen miles from our point of entrance. A high, tooth-shaped rock, not easily missed when travelling upstream, marks the spot where we left the main canyon, a gigantic affair which turns to the left.

We were in quest of cliff ruins. As experience had taught us that side canyons, rather than main canyons, contain cliff ruins, we followed a side canyon. We were not mistaken. One ruin after another, small and large, came into view. We counted thirty-five sites within the space of ten miles. Our Indian told us that no white man had ever entered the canyon before, but that one man, who some twenty years earlier had tried to get in, was chased out by his people. The ruins had not been disturbed by digging. If thirty-five ruins in one small area is the ratio to be applied to the entire Tse-a-Chong complex of canyons, it is not unreasonable to calculate that we were in the presence of some one hundred and fifty untouched sites of cliff ruins, possibly the largest single aggregation of virgin territory. Morris had procured correct information. Persistence and good fortune aided us in finding, without serious hardship, this Treasure Island in the desert. Here, then, is available the most promising kind of material for several years' work. It should not be neglected.

It was late when we reached a camping place in a clump of cottonwood trees. The crimson radiance of the setting sun was still glowing in the sky, though its vivid painting on rocks and reaches had surrendered to the sombre hues of twilight. Our camp at first looked cosy and cheerful enough. Preoccupied by our evening meal in the circle of our campfire, we ignored the silent approach of the solemn, lonely desert night. Relaxed, we rejoiced in the achievements which that

day had to its credit, with full faith in the ultimate accomplishment of our purpose. The night stole up. Cool, even cold breezes came in puffs. More wood on the dying flames was imperative, for Johnson had just finished a story about Piute cattle thieves and Morris had begun to describe a skeleton. Bats were flying low and night hawks whisked by. There were mosquitoes. It was getting colder. I encouraged conversation, for going to bed in the chilly, snappy air was not inviting. More and more frequently the baked side of our bodies had to be shifted to give the windward side a chance to thaw out. Eventually the heroic deed of going to bed had to be carried out before the burning logs had lost their heating power. The warmth of plenty of blankets, though they were torn by stamping mules, and my red woollen nightcap soon made me comfortable.

The moon had risen. One side of the canyon was velvety black. The jagged edges of its rim painted fantastic zigzags against the opposite illuminated side. To the calm observer it suggested merely a champagne-coloured wall, furrowed by dark, bold strokes, indentations of its own wrinkles. To those of a more emotional disposition, whose imaginations inclined to run wild, it had a ghastly look, the colour associated with the pallor of death. If the playfulness of the mind had stopped there Morpheus would soon have gained control, but the shadows have a way of recalling shapes. The head of a monster coyote, the full form of a grazing

ostrich, were the figures I made out after our heated day's ride. On these my eyes were riveted when suddenly I saw a muscular forearm, with wrist and hand, a digit pointing heaven-ward, all in gigantic proportion. I could not move my eyes. I seemed hypnotized. The changing position of the moon did not modify the shape of this threatening arm. I concluded it was something more real than a shadow, and it was.

Morning brought calm and more light. The arm and outstretched digit were there; the black weathering of the rock, the vertical streaks caused by melting snow so characteristic and picturesque on the rock walls of these regions, had lithographed the ominous arm and commanding finger. The grazing ostrich proved to be a deep recess in the rock wall, which a photograph reproduced next day when the sun was in the same position as the moon had been the night before. The coyote could not be traced in the daytime.

Such flights of imagination, however, are rare. The body and the senses are tired. They claim the rest due them soon after the head touches the pillow, but now and then there is time for the eye to be transfixed by the beauty of the steel-blue sky and the brilliancy of the constellations sailing silently overhead. At no time does man look up more than when he is down. This is literally and figuratively true, and out in these lands more than elsewhere. The surroundings awe him, his dependence on Divine guidance is felt, instinctively he realizes the presence of his Creator.

Long before dawn Al, Jess, and the Indian were out to round up the horses and mules—an irksome task, somewhat lightened by the bribe the animals expected in the form of a nosebag full of oats. This slight but important trick brings them closer to camp in the morning hours than if there were no delicacy awaiting them. This is another reason why no expedition dares to run out of oats or corn and why wayside grazing is so important for the conservation of the supply of home-grown fodder. Horses and mules, though hobbled, can travel as much as ten miles during the night in search of water and grass or to escape homeward and, though the leader horse carries a cowbell, at times they separate into groups. They may get into places endangering life and limb, they may tear their hobble-rope and in many ways upset the plans. The nosebag, with its few handfuls of oats, minimizes this risk.

Daily, at sunrise, Johnson and Wetherill start our campfire. Their toilet is an easy task, for these men, out on a rampage like ours, rarely take off their clothes at night. This is not because of undue modesty or slovenliness, but because many things may happen that require prompt action. One night we had to get up hurriedly to smother our fires. When we lay down they were nearly out, but a sudden wind fanned them into flames, with sparks flying in the direction of our baggage. At another time there was a threat of rain. We had covered our packs with tarpaulins. A heavy blow came up and unlashed them. It required quick action

by a hastily summoned force. Such a force, uniformed in pajamas, would have been greatly handicapped!

On another night we drove our animals into a small side canyon, and barricaded the entrance with tree trunks. Hunger drove the animals to desperation. They demolished the barricade, invaded our camp, and tore at our corn and oat bags. The invasion had to be checked and the animals returned to the boundaries of their sterile domicile. A bootless, nightshirted guard in a cactus-carpeted country would have been quite unfit for such sudden night duty.

A large cliff site just below us in Tse-a-Chong which we called Promontory Ruin, and another, a little way upstream, lent charm to our camp. The latter we called Bone Awl Cave, because of the many bone awls we found there. The Promontory Ruin is a huge settlement. Houses strung out, probably for five or six hundred feet, covered a space set deep in the cavernous shadow. A rock saddle like a promontory jutted out on the right-hand side, and there, unprotected by the cave roof, were a number of other houses. These, Morris said, must have served as outposts, a military feature. This promontory determined the name of the ruin. Wetherill and Morris tried to climb it, but failed. They did not attempt to scale the main ruins, as these were at least one hundred feet above the canyon bottom and the steps cut into their pedestal by the aborigines had been entirely washed away, as had the natural crevices, until there

were no footholds. A curious feature of another ruin in this canyon was a long wall with many window-like openings, which, as they were not needed for light or air, and were too small for entrances, must have been used for the protection of those repelling an approaching enemy with arrows or other missiles. Specimens of "throwing stones" may be found at almost every ancient ruin.

Petroglyph Rock

May 30th dawned clear and cool, but frightfully windy. We broke camp very early, for we were facing a long day's work. At noon, moving downstream, we reached a low, black, rounded rock covering probably two to three acres. It was literally covered with drawings, some very old, others modern. The ancient pictographs were made with stone implements, the contours of the design picked in with dots. In some of the later periods the pictures were in solid carved lines, and in others the object was drawn in chalk, charcoal, and soft hematite. All these types were represented here. We named the spot Petroglyph Rock. It may be easily identified, for its easterly face is blackened and the designs stand out white against the dark background. Petroglyph Rock may yet become famous as the Rosetta Stone of America.

Modern American children in the larger cities, where they lack playgrounds, chalk hopscotches, animals, trees, houses, automobiles, trains, etc., on the side-

walks. The ancient Indians, whether of the Basket-Maker Age—estimated to have lived 1,500 to 2,500 years ago—or of the Pottery-Maker period—which lasted to the time when Columbus reached the American continent—and the present-day Indian, all have had the desire to depict, for religious or descriptive purposes, what their minds conceived or their eyes saw.

The similarity in the motive, the method, and the artistic feeling between the modern white man in his childhood and both aborigines and present-day Indian is very striking. There is the same intense sincerity in their drawings which we admire in the primitive art of the Assyrians, Chinese, Egyptians, early Greeks, and Etruscans.

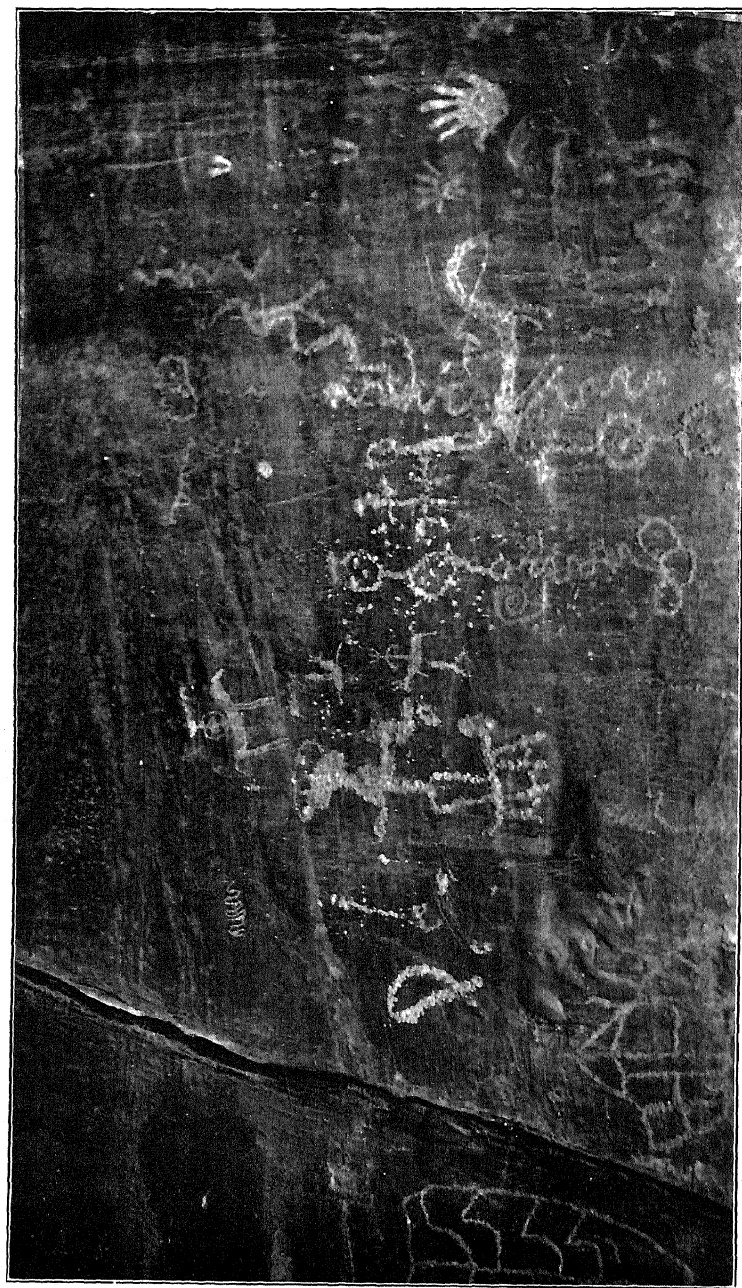
In Canyon del Muerto we found a strange drawing of a cavalcade of horses ridden by men in knightly and priestly trappings. They carried crosses, flags, and swords, and represented, undoubtedly, Spanish priests and soldiers. Our theory for the existence of this curious picture, the Spanish character of which is quite conclusive, is that when the padres and conquistadores became aware of the veneration felt by the natives for their rock-drawings, they followed the example of the Indians and drew pictures to express their own customs.

Round Rock

Hosteen Yazzi, whom we induced to show us the way to Round Rock, proved to be an experienced guide. His home is on the top of the canyon rim not



Petroglyph Rock in Tse-a-Chong Canyon. Modern pictographs are superimposed on ancient ones. This rock may yet become an American Rosetta Stone, helping to decipher many of these American hieroglyphics.



Detail of the Petroglyph Rock.

far from Petroglyph. Wetherill knew him. His fee for guiding us was moderate. I could speak to him in Spanish which he understood—or pretended to understand: an improvement on my efforts with other Navajo Indians, with whom conversation was possible only through the means of a vocabulary of some ten or fifteen words. Wetherill, Morris, and Julian returned from Petroglyph to To-Thla-Kan, to bring the automobiles and horses to Round Rock by the long, circuitous route to the west.

Johnson and I, with Hosteen Yazzi, cut across country on our horses, taking three pack animals with us. Hosteen Yazzi's blue-gray pony, one of the finest specimens I have ever seen, gave no end of trouble. The little beauty would have nothing to do with our outfit and ran away before he was saddled. All hands helping, we drove him into a small cove from which there was no outlet and finally lassoed, bound, and blindfolded him. During the entire afternoon Yazzi had to ride far in the lead, in order to keep our dilapidated crowd out of his mount's aristocratic vision. This made us all move with unusual speed under about as trying circumstances as can be imagined. Twenty to twenty-five miles, in addition to the ten or more covered in the morning, were made before sundown, in the face of a raging gale. We finally reached Round Rock, a trading post on the wash of the Lukachuka streamlet, at that time a sandy, waterless ditch, half a mile or more in width.

A feature of the journey between Petroglyph and Round Rock, aside from climbing and descending exceedingly steep trails, was the majestic scenery of the valley which in its western reaches is called "Monument Valley." "Los Gigantes" is the name of two sentinel rocks similar to gateposts, at the entrance to the level lands. Their name is fully descriptive but their massiveness cannot be conveyed. All to the south and northwest queer-shaped red cylinders and cubes stood out in the opalescent haze of the sandblast. On account of the wind we did not dare go out of our way to view them at close range. We had to reach Round Rock and water that night; we had to tend our animals and our own blistered faces and aching eyes. When Round Rock, a cheerful trading post, was reached, we felt as though a heavy load had been partly lifted. We decided to remain there, awaiting our horses and mules, which were in charge of Julian, and our two automobiles, in charge of Wetherill and Morris. If they had met with the kind of blast that we had we might have to give them help. McLaughlin, a young Eastern man, runs the trading post here; he has a Mexican assistant. As usual, I slept in the open, though accommodations were offered by the hospitable trader. Johnson did the same; he would not desert me. Although encamped in the lee of a small elevation, we were next morning in a condition to be literally dug out of the sand. But sand is not dirt, and is harmless, except that everything, including one's teeth and hair, feels gritty.

While awaiting the arrival of our friends we used our time digging in the elevations to the south of Lukachuka Wash, where there are acres of pottery chips. In spite of all our work we did not find a single unbroken piece. How our crippled automobiles fared in the gale which kept up persistently was a thought that obsessed us all day. My dislike of exploring with a combination of animals and machines is unchanged. This possibly has its foundation in the fact that men out here are careless of their cars, making them do things for which they were never intended. They force them to the limit, as they do their horses. My preference is, and always has been, for horse and mule. There is more freedom of motion, often more speed. The desert horse and mule can be trusted to pick their way over any obstacle which man can cross unaided by his hands.

McLaughlin had three or four cats around his trading post. He explained that since he had kept them, rattlesnakes, which at one time were numerous, kept away. He gave us the impression that cats either drive away or kill rattlers. Neither is correct, I believe. What probably happens is that the cats kill the mice and the rattlers leave when their favourite food supply is gone.

Marooned as we were by the sandstorm, it will not surprise that rattlesnake stories were told to pass the time. McLaughlin told of his narrow escape when he reached out for some rope in a dark part of his store

and found a rattler nesting in the rope coil. He was saved only because the snake could not reach out to strike. He told us that rattlers feed on carrion and declared that he had seen a cow's carcass which harboured seven. Some of us doubted this tale. The carcass was probably their shelter, as was the hollow under Johnson's saddle, in which one morning he discovered a rattler sleeping, after he himself had passed the night resting his head on the saddle as a pillow, within three or four inches of a dangerous enemy. Mormonlike, he did not harm the reptile which had so peacefully enjoyed his hospitality. Another story was of a dog which was bitten in the shoulders by a rattler. The animal, by burying itself up to the neck in the black river ooze, for several days, neutralized the poison and recovered completely.

At five P.M. on May 31st our automobiles arrived, and two hours later our pack animals, all in fair condition. The wind continued. It suggested the swishing sound of a railroad engine when it starts. It is different from the wind that we hear in our larger cities, where there are puffs and intermissions. Here it blows incessantly. Morris turned up late for dinner. He whispered to me that where Johnson and I had found only broken bits of pottery that afternoon, he, in one hour's digging, had found two complete jars, two bowls, and a ladle. In order to prevent wholesale digging for commercial purposes we did not speak of Morris's find.

The night was bitter cold. Wetherill and Morris

slept inside the house; Johnson and I in the open. My woollen nightcap was again most useful. Tarpaulins, woollen blankets, a rubber coat, and an overcoat all together were not enough to keep me warm.

Greasewood

On June 1st we travelled by automobile to Greasewood, seventeen miles due south. We stopped there with Dustin and Wade, who have one of the best equipped trading posts I have ever met with in the desert. Wade, who is Wetherill's brother-in-law, was at home. Mrs. Dustin and her two daughters prepared lunch for us. Julian, with our animals, had in the meantime arrived from Round Rock.

While at lunch Wade pointed to some holes in the window panes and walls. They were bullet holes. A year ago, so his story went, there was another trader-tenant in charge of the place. His name was Marti. Mr. Almond, sitting next to me at luncheon, was his clerk. They were at dinner in the kitchen. Through the window two shots, meant for Marti, were fired. The first went wild and imbedded itself in the ceiling; the second grazed the forehead of Marti's son, deflected, and went through Almond's shoulder, just under the bone, without severing vein or artery, and after penetrating the wall into the adjoining room went through the mirror of the bureau and finally imbedded itself in the wall near the ceiling opposite. Marti, no doubt, knew the name of the assailant, but refused to help in

his capture, as other frontiersmen would have done. Instead he gave up the store shortly afterward. Almond has recovered, except for a slight paralysis of the arm. Young Marti's injury was not serious.

Canyon del Muerto

Automobile trouble delayed our start for the headwaters of Canyon del Muerto, which we hoped to reach at a spot near Sehili, on Gregory's map. Nobody had ever heard of a place by that name. The delayed start caused us to camp twenty miles south of Greasewood, on a ridge overlooking Monument Valley, to the west, with Agathla's Needle and Skeleton Mesa on the horizon. On the east, bathed in sunset colours, were the cliffs of the Lukachuka Mountains. Our horses having come, we parked our two cars, leaving them in charge of an Indian whom we had taken with us for the purpose from Greasewood, and rode to the brink of Canyon del Muerto. We had four days at our disposal and planned to penetrate the upper portions of this canyon, which are but rarely visited. We wanted to explore them as thoroughly as possible. We were trying to determine whether there had been Basket-Makers as well as Pottery-Making cliff dwellers in these parts, and to what extent. We also were bent on taking photographs of some of the interesting pictographs known to be in this canyon. The descent into the canyon is a bit rough, the sort of trail one would rather ascend. Wood being scarce in Canyon del Muerto, we

had to search for a camp site where a supply was available. The dead trunk of a box-elder tree, swept there by a flood, determined the location of our camp. Fortunately there was also a fair amount of wayside forage.

Screen Cave

A quarter of a mile away gaped a large cave, with houses strung out for possibly seven hundred feet. Two stone slabs, each several hundred feet high, looking like the leaves of a screen, suggested the name "Screen Cave." The houses were in fair condition, some crude, others of more advanced workmanship. Excavations by Wetherill and Morris disclosed undisturbed graves of the Basket-Makers.

I strongly urge that, when digging is being done, any one caring for his health be not tempted by curiosity to stand too close to the workers, unless he stays on the windward side. The dust has a sharp, musty odour and when it penetrates throat and chest causes an irritating cough, which only care and time can cure. Dust masks should be worn by all those doing the actual digging.

The next day we travelled toward the headwaters of Del Muerto and found the canyon to be a rich storehouse of ancient cliff sites, as well as a picture gallery of rock drawings by the people who had lived there in ancient and modern times. Often we found drawings of all periods jumbled together, late pictures superimposed upon the earlier ones,

Mummy Cave

Mummy Cave was visited by us several times. For years it has been known by that name. It is not very large but has a distinctive feature, a square, tower-like three-story structure in the centre. Its masonry suggests cabinet work, so carefully are the stones and seams joined. Ugly and threatening cracks are indications that this unusually interesting ruin will crumble before many years have passed. The feature most interesting to us was the discovery of a pit containing the skeletons of at least five men of extraordinary size. There was no relationship between them and the cliff-dwelling, pottery-making type of aborigines. These latter, judging by the size of their doors and houses, and the imprints of their hands, were of small stature, somewhat like the Japanese.

Wetherill and Morris were overjoyed at this discovery. To these trained and practical archæologists this find meant a great deal. They had before them a very early type of Basket-Makers. They felt convinced that the skeletons were those of high priests, or medicine men, because of the contents of the pit. The remains of a feather cloak were spread over the bodies. Its texture was not unlike a fishnet. Wherever two strands of threads crossed each other they were tied into a knot and each knot still held the quill of what was once a feather. The weave being close, the feathers must have furnished a cover for all the interstices of the foundation. The thread

composing the cloak was made of yucca fibre, of which we found large bundles in the pit, both spun and unspun. Big pieces of buckskin and coils of rope and twine were there in plenty, and many sandals. The design and fineness of texture of these showed a high degree of skill. Three stone pipes, corncobs of large size with all the kernels on them, human hair, and a flute made out of a reed an inch in diameter, completed our find. A primitive pictograph of three men playing flutes found not far from here may have some connection with our finding a flute on this spot. Wetherill thought the bones might have been those of men belonging to a "Flute-playing Clan."

Morris's inquisitive turn of mind made him excavate one of the houses to an unusual depth. Several feet below the surface of the débris he discovered that the wall of the house had a white, kalsomine-like veneer. He kept on and found a frieze. Had its fret design been found in China, or ancient Greece, it would have been considered quite in place. No such frieze, or anything like it, had ever been found in the Southwest. From what source, I wonder, did these early savages borrow their ideas? Does not the artistic similarity point to the Asiatic origin of our aborigines and confirm the anthropological indications which are often pronounced?

The discovery here referred to induced the American Museum of Natural History to vote promptly the necessary funds for Morris to return and excavate. Less than a month after our discovery, Morris, with a small

excavation unit, had uncovered a most extraordinary collection of baskets, skeletons, nets used for snares, sandals, and a medicine-man's outfit. The latter was contained in a wooden receptacle. Its contents were surprising. A number of skins of birds were in as perfect condition as though displayed in a millinery shop on Fifth Avenue. A gaming outfit and other objects, of unknown purpose, were also in perfect condition.

Antelope Cave

I like to revisit certain places I have seen. I can thus better understand the things seen and gather up what I may have missed. There was no other reason for my insisting that June 3rd be used for a ride down Canyon del Muerto and a visit to Antelope Cave, where I had been in 1918. I had then been fascinated by the really exquisite drawings of antelopes in three colours, black, red, and white, outside that cave. We were most wasteful of films. We wanted the best pictures obtainable, and I think we have them.

In the meantime, indefatigable Morris was digging on. He instinctively knows where to dig. His labours resulted in unearthing ten sandals, matting, beans that looked as fresh as though shelled the day before, a round mat made of reeds with which to carry pottery on the head, and two baby toys, which were probably made to revolve when hung in the wind above a child's head.

Judging by the test diggings made by Wetherill and

Morris it would seem that four or five types of aborigines are represented here. Low down there are early Basket-Makers, a hardy, warlike, big-boned race that could take care of itself, and could risk living at the foot of the cliffs, disdaining the security offered by the caves above them, though they had the habit of burying their dead in these secure places. Then "Post Basket Makers," a name given certain aborigines by Professor Guernsey and Professor Kidder, built in the caves. They had the habit of plundering the graves of their ancestors for turquoises and other trinkets, hence digging in these remains hardly ever results in finding anything beyond bones, torn baskets, and mats. Our digging, when successful, was almost invariably at the foot of cliff ruins high enough to prevent water seepage from destroying the contents of the graves.

Our search up the canyon, on June 4th, proved a failure archæologically, but it led us into a most beautiful side canyon with fine cottonwood trees. Their spread of one hundred feet and more and the picturesque cliffs give the canyon artistic value.

On June 5th we climbed out of Canyon del Muerto by the same rough-and-ready trail on which we entered. We found our stoical Indian and our automobiles as we had left them four days earlier.

We started toward Gallup on our two automobile prairie-schooners. We meant to go by the way of a trading post called Crystal, but lost our way. By this

I mean we ended up by being somewhere without any road. We cut across dry, sandy river-beds, rocky prairies, and, after unmerciful cruelty to our cars, we finally reached Crystal. Minor repairs, frequent, of course, were the only delaying features.

Venus' Needle, a volcanic core, came into view. A deserted stone house near it offered shelter for Wetherill and Morris. It had turned very cold. Johnson and I slept outside and, being short of blankets, Johnson made himself a couch out of young sage in the lee of the house, which he declared warm, soft, and luxurious. I put all my belongings under and over me, with my packs banked as windbreaks. The moon rose late and the coyotes near by had a talkfest. To change my clothes for pajamas, a practice I never gave up, required courage, as did also the dressing next morning.

We reached Fort Defiance at eleven o'clock on June 6th and Gallup three hours later. Thus ended a journey, a makeshift, perhaps, because hurriedly and inadequately prepared. It demonstrated that we tried to do too much in too little time, as most travellers do; but it clearly determined that four important historic group sites are available for systematic excavations: (1) Cemetery Ridge; (2) Tse-a-Chong Canyon; (3) Round Rock; and (4) Canyon del Muerto.

I should advise giving preference to systematic excavations in Tse-a Chong. A more promising untouched field of large extent probably does not exist anywhere in our Southwest.

POSTSCRIPT

SYNOPSIS OF THE 1924 EXPEDITION

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The Expedition of 1924 was carried out after this book had been placed in the printer's hands; hence this postscript.

As my report to the American Museum of Natural History (New York) best suits the purposes of this postscript, it is appended:

July 8th, 1924.

PROFESSOR CLARK WISSLER,
Department of Anthropology,
American Museum of Natural History,
Central Park West and 77th Street,
New York City, N. Y.

DEAR PROFESSOR WISSLER:

You authorized me to consider my expedition and exploration in June of this year as conducted under the auspices of the American Museum of Natural History; a report, therefore, is in order.

Our explorations were in northern Arizona and in the Bad Lands east of the Colorado River and south of the San Juan River.

We were on horseback for twenty days, starting and ending at Kayenta, Arizona.

Our objective was two-fold:

1st: To follow the course of Navajo Canyon to the point where it unites with the Colorado River.

2nd: To climb and explore Cummings Mesa.

We did all of this and more. We penetrated the mysterious

Kettle Country and determined that it harbours the beginning of Forbidding Canyon as well as the source of its streamlet.

In Neskla-nizadi Canyon (meaning Long Branch Canyon), a tributary of Navajo Canyon, we found a stone slab containing thirty dinosaur tracks, most of them very distinct, while at least ten of them are as clear and well-defined as though they were made but yesterday.

Navajo Canyon

This Canyon is about eighty miles long. We covered its entire length excepting a few miles at its head and about five miles near Neetsin Canyon. Both of these sections are easy of travel.

The Canyon had been declared impassable by the Indians and the very few white men who have tried its quicksands. Its lower reaches, the fifty-three miles from Jay-i Creek to the spot where it enters the Colorado River, had never been traversed by white man—excepting by our expedition of 1921, in which Dr. Earl H. Morris of the Museum staff took part. At that time we went as far as Barricade Ruin, a prehistoric cliff site about fifteen or eighteen miles from the Colorado River. In most parts the Canyon is narrow, its rocky sides precipitous, and, excepting in occasional coves, bare of vegetation, having been swept clear of plant-nourishing soil by floods; its streamlet is tortuous and its shores and bottom covered with a gelatinous quicksand. The last fifty miles (representing one hundred miles of travel going and coming) were so unsteady that we had to cross the streamlet by actual calculation, in which all of our party concurred, no less than nine hundred times.

A bight of the Colorado River, about one-quarter mile long, receives the waters of Navajo Canyon. It is swampy and shallow, lined with jutting rock shoulders covered with thick underbrush which we penetrated on foot; to cross the intersecting waters, I straddled the back of one of my guides, who, for the purpose, had to strip.

Navajo Canyon is dangerous in the extreme, and only passable under exceptionally favourable conditions, such as prevail



The dinosaur footprints found by us in 1924 in Neskla Nizadi Canyon, a northern tributary of Navajo Canyon. The depressions have been filled with water to insure the necessary contrast because of the strong noonday sun.

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after a prolonged drought and if no rain falls while it is being traversed. Even then it is poor, as we had ample opportunity to learn for ourselves. A mere shower would make travelling in the Canyon most hazardous. We were constantly on the alert examining the rim rocks and shores for a line of retreat in the event of a rise of the waters in the Canyon by reason of rain in its head-waters or tributaries.

The scenery is magnificent, but there are many safer canyons equally as beautiful. We explored the full length of its side canyon, called "Pila-yazzi-boco," which means "Little Finger Canyon." We also explored another side canyon named "Neskla-nizadi." We followed it to the junction of the three branches which compose it and which, from west to east, we named "Sunset Canyon," "Forty Caves Canyon," and "Pyramid Canyon." We followed Forty Caves Canyon to its head, where we climbed out. We christened the Canyon "Forty Caves" because of the many caves lining its upper shelf—all very likely places for fruitful excavations because of their proper exposure, because water was near by, and because of the arable flats suitable for cultivation.

The climb from our camp (which we called "Alamo Grande," because of the many very large cottonwood trees) to the rim of the Kettle, though not hard, presented grave difficulties and serious tangles when we finally descended into it, while the ascent was most harassing. By this time our animals were fortunately lightly loaded, but each of the six men comprising our party had his hands full and his mind weighted with responsibility. I strongly urge that Forty Caves Canyon be put on the list for prospective intensive exploration. The scenery is spectacular in the extreme.

Cummings Mesa

Three hours and a half on horseback from our Jay-i Creek Camp between the rock group called "Crouching Camel" in the west and "Octagon Mesa" in the east, over a very dangerous trail, brought us to a spot where the Mesa could be climbed on foot and which our animals could negotiate if left to their own devices. We were led by an Indian whom we picked up

on the way. We named this "Chimney Flue" and the camp below, where we found water, "Mushroom Camp."

The mesa top is about fifteen hundred feet above our camp. Three days in succession we climbed this in order to explore the mesa top fairly well. We found it to be about twenty miles long from north to south and about ten to twelve miles wide from east to west, dissected at its northerly end by two very deep and wide major canyons. The top was literally carpeted by pink-blossomed cacti, the brink on all sides precipitous and dizzy. The view from the promontories is magnificent. We examined eight or ten prehistoric sites, but all of us felt certain that there are twice as many more. The top is waterless and more than likely its population of the dim past had to use cisterns in order to secure a water supply. The two canyons at the northerly end create three finger-like land masses. We travelled the middle one until stopped by a narrowing down (a quarter mile or less) to a mere neck, twenty to thirty feet wide, which at its narrowest end was depressed probably one hundred feet. Its broken rock jumbles were impassable. Beyond this neck, the Mesa again spreads out into broad reaches. Our Navajo told us that at the bottom of this narrow neck there was a hole, the two canyons probably having approached and broken through. We thought we could discern the hole, but as to this we were not quite certain. We penetrated to the east and southeast brink and had a close view of the shallow depression where Cummings Mesa connects with Octagon Mesa; of Navajo Mountain in the east; of No Name Mesa and The Saddle, the latter the key to the trail we discovered and used in order to reach the Rainbow Bridge by the west of Navajo Mountain in 1922. The Mesa had been climbed by our head guide, John Wetherill, twelve years ago while leading Professor Byron Cummings, Dean of the University of Arizona. At that time, however, they spent but two hours on top, while we put in the greater part of three days on the Mesa. The future archaeological explorer will find here a very large and promising field for excavation, but it will mean dry work and trying daily climbs (its top being about eight thousand feet above sea level) from the camp and water at the foot of the Mesa.

Dinosaur Tracks

John Wetherill had known of "Yetso Beta," the Navajo's name (meaning "God's Tracks") for tracks of prehistoric animals. The Navajo whom we chanced to pick up guided us over a rough trail to these tracks in Neskla-nizadi Canyon. He had no difficulty in finding them. Thirty tracks are exposed and more can be cleared by digging away the loose sand to the west. Most of the impressions are very distinct and fully ten of them are as clear and sharp and deep as if they had just been made. The tracks are of three-toed animals. The largest has a spread of fourteen inches from the heel to the tip of the claw. The stride measures forty to forty-two inches from heel to heel. At least four animals disported on the clay which retains their impress. The horizontal stone slab containing the impressions measures about twelve by thirty feet as far as we have exposed it. It is about two to three inches thick and, Wetherill assures me, can be removed without great difficulty. It is between the Jurassic Wingate sandstone formation below and Todilto formation above. I have taken a small fragment of the hardened stone slab. Mr. Wetherill estimates that it could be removed and packed, requiring about forty loads, and delivered at the railroad.*

The ability, desert craft, and generalship of my guides, John Wetherill and Zeke Johnson, and the assistance given by our three helpers, Richard Wetherill, Junior Johnson, and Julian Edmondson, were of a very superior order. All worked together in perfect harmony. Our thirty horses and mules were in prime condition. Nothing was lacking.

Most sincerely,
CHARLES L. BERNHEIMER.

Altogether, our 1924 Expedition was a complete success in that we carried out all that we had planned and even more, but I do not recommend that others

*The tracks, after careful examination, have been pronounced by the Museum's experts as those of dinosaurs.

follow in our footsteps, excepting for scientific purposes. Navajo Canyon is passable at times, but always dangerous in the extreme. Cummings Mesa is interesting to the naturalist, but its climb very tiring. The Kettle is well worth visiting, but its entrance from the south and its exit from the north are over extremely rough trails.

The map made by us giving minute details of our journey is not yet ready for publication.

APPENDIX

Supplies which have proven their worth and should be included with those which experienced guides suggest.

Food Items

Sugar	Canned Corn
Bacon	Bran
Whole Ham	Bread
Canned Beans	Lard
Canned Vegetable Soup	Potatoes
Steero Cubes	Pepper and Salt
Jam (in glass)	Coffee
Cream of Wheat	Tea
Condensed Milk	Canned String Beans
Sardines in Olive Oil	Catsup
Canned Pears, Grapes, and Cherries	Macaroni canned—preferably with Tomatoes
Canned Tomatoes	Seedless Raisins
Cheese	Postum
Soda Biscuits	Dried Split Yellow Peas
Flour in bag	Dried Prunes
Canned Peas	Smoked Shredded Beef in glass
Malted Milk Tablets	Baking Powder
Cocoa	
Honey	

Medicines

Bicarbonate of Soda Tablets	Tweezers
Adhesive Plaster 1- and 2-inch rolls	First Aid Kit
Liquid Skin	Analgesic Balm
Boracic Acid—powdered	Musterole
	Mentholatum

Medicines—Continued

Johnson's Digestive Tablets	Unguentine
Kondon's Jelly	Argyrol—solution for eyes
Permanganate of Potassium	Aristol
Sterilized Hypodermic Syringe and 2 gold points	Peroxide of Hydrogen or Chlorazene
Strychnine	Iodine
Fraser's Bismuth Sub. No. 2 (for Dysentery)	Lanolin Cream
Ammonia 15%	Resinol Salve
Talcum Powder	Pond's Extract
Aspirin	Jamaica Ginger
Absorbent Cotton	Alcohol
Sterilized Gauze	Oiled Silk for wet packing
Cathartics	Ichthyol Salve
Emetic	Mosquitone
Cough Candy	Everhot Water Bottle and packs
Zinc Ointment	Bandage Rolls
Scissors, sterilized	Campho-Menthol Tablets
Scalpel, sterilized	

General Items

Hand Soap	Cotton Bandana
Bar Soap	Stetson Felt Hat with stiff rim
Dish Rags—any cheap white material	Stout Leather Leggings
Unbleached Muslin	Two yards Rubber-lined Sheet- ing
Matches	Rubber Slicker for use on Horseback
Toilet Paper	Turkish Towels
Photographic Camera	Mosquito Netting
Films	Needle and Thread
Rubber-soled Shoes	Safety Pins
Rubber Air Mattress	Two-gallon Water Bag
Woolen Skating Cap	Coloured Eye Glasses
Cotton Gauntlets	Traveller's Checks
Woolen Outing Shirts	

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